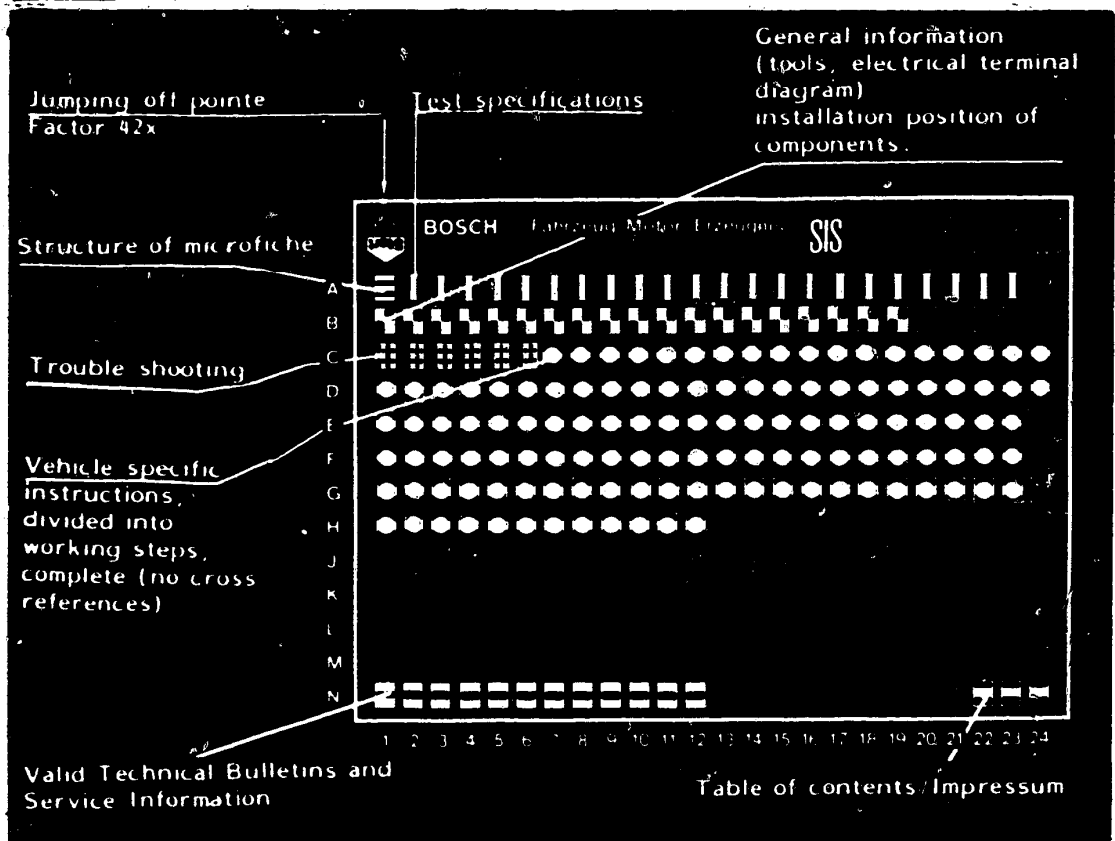


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

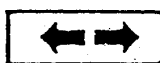
E16	Product/component/test step
	Vehicle/engine

Coordinate

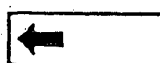
3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1	Trouble-shooting program	
-----------	--------------------------	--

1. Special features

Engine: 2.2 ltrs. - 5 cyl. 88 kW/120 bhp
Equipment: KE-Jetronic, with altitude correction,
lambda closed-loop control, and idle
speed control.

2. Test specifications

<u>Test step</u>	<u>Test specifications*</u>
------------------	-----------------------------

<u>2.1 Electric fuel pump:</u>	
------------------------------------	--

C21

Fuel delivery:	min. 1300 cm ³ /min.
----------------	---------------------------------

<u>2.2 Fuel pressures:</u>	
----------------------------	--

D3

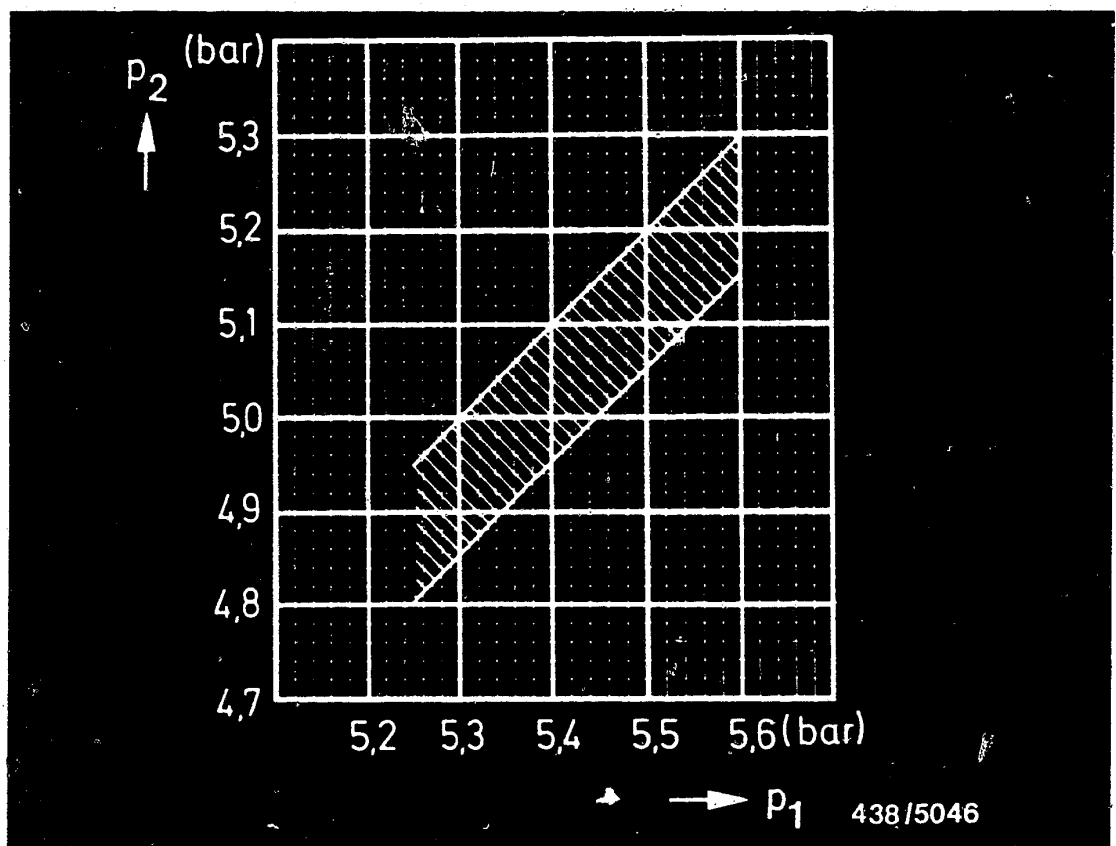
Primary pressure	5.25 ... 5.6 bar (5.35 ... 5.7 kgf/cm ²)
------------------	---

*Pressures indicated in test specifications in bar
(gauge pressure) and/or in kgf/cm² (gauge pressure).

A2

Special features/test specifications
Audi 4000, four-wheel drive (USA)





p_1 = Primary pressure

p_2 = Lower chamber pressure, actuator current = 10 mA

Differential pressure:

(Primary pressure/lower chamber pressure)

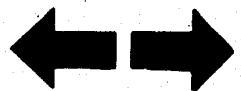
D3

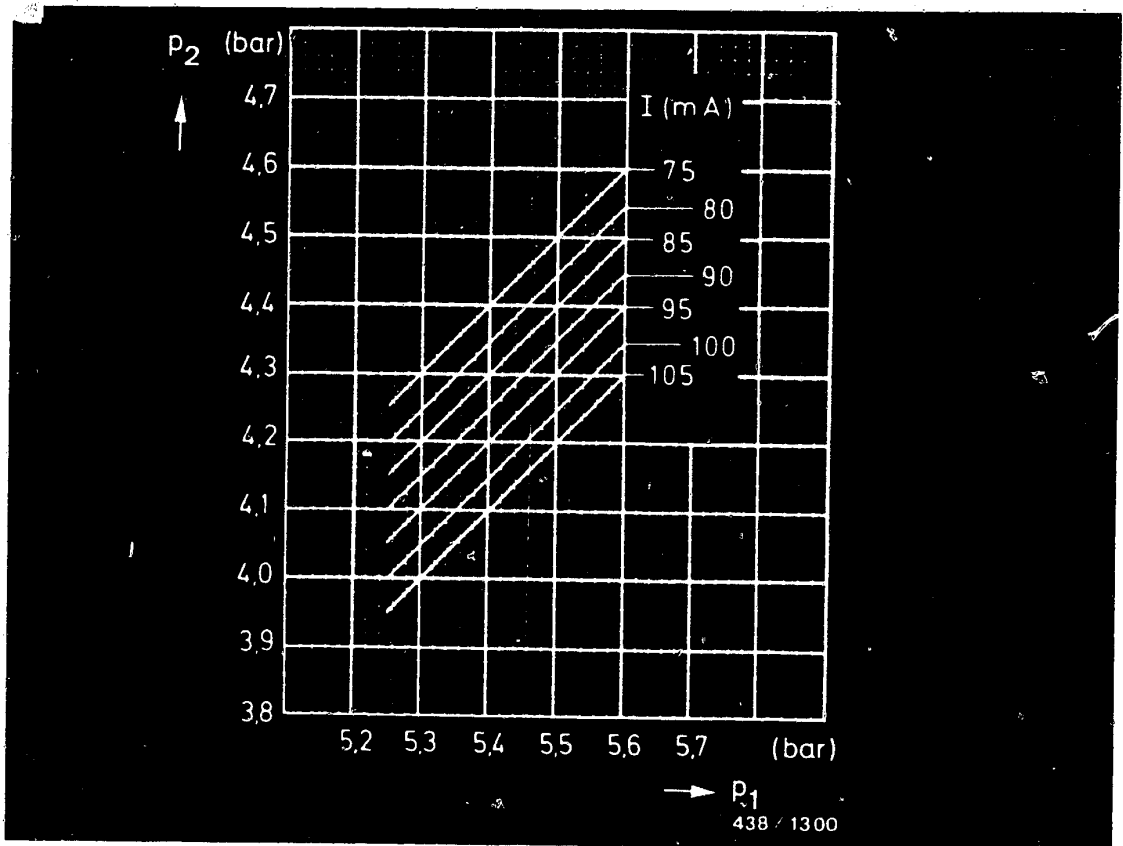
Obtain the specified value for "warm" lower chamber pressure from the diagram to correspond to the primary pressure as measured.

A3

Test specifications

Audi 4000 four-wheel drive (USA)





p_1 = Primary pressure

p_2 = "Cold" lower chamber pressure. Tolerance
 ± 0.15 bar

I = Actuator current

D3

Obtain the specified value for "cold" lower chamber pressure from the diagram to correspond to the primary pressure as measured and to the actuator current as measured. The "cold" condition is simulated by disconnecting the lead plug at the temperature sensor (NTC).

A4

Test specifications

Audi 4000 four-wheel drive (USA)



Test stepTest specifications:***D3**2.3 Testing the fuel system as a whole
for leaks:

Min. pressure after 10 min: 2.7 bar (2.8 kgf/cm²)
after 20 min: 2.6 bar (2.7 kgf/cm²)

E32.4 Fuel-injection valves:**

Opening pressure 3.0...4.1 bar
(3.1...4.2 kgf/cm²)

E112.5 Checking the fuel distributor:**

(Checking with pressure actuator attached.
Actuator current 10 mA)

Comparative measurement of fuel deliveries from outlets:	Setting point	Max. allowable fuel delivery
Idle:	6.0 cm ³ /min	6.6 cm ³ /min
Part load:	40.0 cm ³ /min	42.5 cm ³ /min
Full load:	100.0 cm ³ /min	109.0 cm ³ /min
Full load with maximum deflection of air-flow sensor plate. Minimum delivery at all outlets:	140.0 cm ³ /min	-----

*Pressures indicated in test specifications in bar
(gauge pressure) and/or kgf/cm² (gauge pressure)

A5

Test specifications

Audi 4000 four-wheel drive (USA)



****Note on the part number for the fuel-injection valve:**

The fuel-injection valves installed in the Audi 4000 four-wheel drive vehicle have the part number 0 437 502 026 (original equipment) or ... 027 (sales designation). These valves have an air-guide cap firmly pressed on (for the air shrouding system). For replacements, order valves with the above sales designation .. 027 and not in accordance with the designation .. 023 as stamped in on the valve stem. Connection for the tester for comparison of fuel delivery using adapter sleeves KDJE-P 200/19

Test step

Test specifications

2.6 Temperature sensor
Measurements of
resistance:

F6

Engine cold, ambient
temperature (+15°C...
+30°C):

1300 ... 3600 Ω

Engine at normal
operating temperature
(approx. +80°C):

250 ... 390 Ω

A6

Test specifications

Audi 4000 four-wheel drive (USA)



2.7 Thermotime switch

Measurements of resistance:

C23

At a temperature	Measurements of resistance between		
	Term. "G" and ground (housing)	Term "W" and ground (housing)	Term. "G" and Term. "W"
Less than +30°C	25...40Ω	0Ω	25...40Ω
Above +40°C	50...80Ω	100...160Ω	50...80Ω

F16

2.8 Air-flow sensor - potentiometer:

Voltage signal with
air-flow sensor plate
in basic position:

0 ... 0.05 V

Test step

Test specifications

G21

2.9 Idle adjustment:*

Idle speed:

Value set by idle
speed control

$= 800 \pm 20 \text{ min}^{-1}$

With on/off ratio

$= 28 \pm 1 \%$

Exhaust gas setting:

Testing of the pres-
sure actuator trigger
current:

Checking value

$= 4 \dots 16 \text{ mA}$

Setting

$= 9 \dots 11 \text{ mA}$

CO-level (check value)

$= 0.3 \dots 1.2 \text{ vol. } \%$

A7

Test specifications

Audi 4000 four-wheel drive (USA)



* Instructions for idle adjustment

The idle speed is automatically controlled by the idle speed control, but the on/off ratio at idle speed is to be checked and if need be corrected by adjustment on the bypass screw (engine speed).

The exhaust gas setting is made automatically by the lambda closed-loop control, but the triggering current for the pressure actuator is to be checked in closed-loop control operation and if need be corrected by adjustment of the idle-mixture-adjusting screw in the mixture-control unit.

Closed-loop control operation can be identified by the pulsing of the reading for current. If the control operation is within the checking value (4 ... 16 mA), no readjustment is required.

If the range for control is not within the limit values, make an adjustment. In so doing, set the average value for the reading pulses at the setting value (9 ... 11 mA).

The CO check value is used to check whether or not there is a leak in the exhaust gas system. CO-sampling at the special exhaust-sample pipe that is connected to the exhaust pipe in front of the catalytic converter and directed to the engine compartment (in the area between the mixture-control unit and the intake manifold). After measurement, reseal the pipe fitting tightly once again.



3. Rapid diagnostic chart for the universal test
adapter ETT 018.01 with KE-Jetronic test lead
1 684 463 135 and a suitable multimeter:






The rapid diagnostic chart below makes it possible for the experienced Jetronic expert to check quickly the electrical/electronic peripheral and control unit functions of the KE-Jetronic including the lambda closed-loop control and idle speed control. If detailed information on trouble-shooting and test methods are required, proceed in principle in accordance with the trouble-shooting chart (Coordinates C 1 - C 6).

Important instructions for the rapid diagnostic chart
below:

The column "test conditions" shows those test steps at which the control unit plug must be plugged in or disconnected. In this regard, make absolutely certain that there is no electricity in the system when plugging in or disconnecting, i.e., it is not permissible to jump the electrical safety circuit.



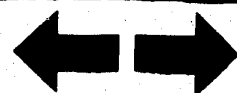
Rapid diagnostic chart for the universal Test Adapter ETT 018:01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
1		4	-	Pressure actuator - internal resistance	12 - 10	Disconnect control unit plug	21 ... 25 Ω	F 6
2		5	-	Temperator sensor - internal resistance +15°C...+30°C: approx. +80°C:	21 - 2	Control unit plug disconnected	1.3...3.6k Ω 250...390 Ω	F 6
3		11	-	Ground, control unit - output stage	20 - 2	Control unit plug disconnected	0...10 Ω	F 8
4		9	-	"Idle" throttle valve switch	13 - 2	N.B.: Measurement of voltage; connection for voltmeter: Negative = black socket "V" Positive = blue socket on left " Ω " Control unit plug disconnected. Switch on ignition. Throttle valve closed: Open throttle valve by hand:	8...15 V 0 V	F 8
5		10	-	"Full load" throttle valve switch	5 - 2	N.B.: Measurement of voltage; connection for the voltmeter: Negative = black socket "V" Positive = blue socket on left " Ω " Control unit plug disconnected. Switch on ignition. Throttle valve closed: Throttle valve fully open:	0 V 8...15 V	F 10

A10

Rapid diagnostic chart

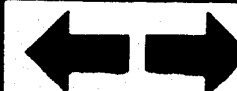
Audi 4000 four-wheel drive (USA)



A11

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
6	4	-	-	Starting signal Terminal 50 -	24 - 2	Control unit plug disconnected. Activate starting motor:	8...15 V	F 12
7	5	-	-	TD-signal (Ignition)	25 - 2	Control unit plug disconnected. Activate starting motor for a few seconds:	Undefined voltage value, however less than u_{batt} .	F 12
8	6	-	-	Control unit - power supply	1 - 2	Control unit plug disconnected Switch on ignition:	8...15 V	F 14
9	7	-	-	Power supply Potentiometer on air-flow sensor and pressure sensor (altitude sensor)	18 - 2	Connect the control unit. Switch on ignition:	7...8 V	F 14
10	8	-	-	Signal - potentiometer on the air-flow sensor	17 - 2	Control unit connected. Switch on ignition. Deflect the air-flow sensor plate by hand, causing rise in voltage to max. 8 V.	0...8 V	F 16

A12

Rapid diagnostic chart
Audi 4000 four-wheel drive (USA)



A13

Rapid diagnostic chart
Audi 4000 four-wheel drive (USA)



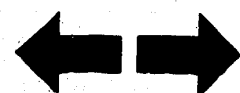
Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
11	10	-	-	Idle actuator - power supply and continuity, coil 1	3 - 2	Switch off ignition. Disconnect the control unit plug. Switch on ignition:	8...15 V	F 18
12	11	-	-	Idle actuator - continuity, coil 2	4 - 2	Control unit plug disconnected. Switch on ignition:	8...15 V	F 20
13	12	-	-	Signal, air conditioner	19 - 2	Control unit plug disconnected. Switch on ignition. Switch on the air conditioner:	8...15 V	F 20
14	13	-	-	Signal, altitude sensor	11 - 2	Switch off ignition. Connect the control unit. Switch on ignition. The signal depends upon altitude: <div> 0 meters (sea level) 500 meters 1000 meters 1500 meters 2000 meters 3000 meters </div>	appr. 6.5 V appr. 5.6 V appr. 4.8 V appr. 4.0 V appr. 3.2 V appr. 2.0 V	F 22
15	14	24	-	Lambda control Closed-loop control operation	23 - 2	Control unit connected. Jump sockets 1 and 2 on the test adapter. Start the engine and warm it up. Closed-loop control operation: Pulsing voltage. Average value:	appr. 3 V	G 1

A14

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)


A15

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
16	-	21	1	Warm-up enrichment - 20°C	12 - 12	Measurement of current! Connection for tester: Negative = black socket 1 Positive = black socket 2 Connect control unit. Disconnect lead plug on altitude sensor. Switch on ignition:	51...71 mA	G 1
17	-	21	2	Actuator current corresponding to engine at normal operating temperature	12 - 12	Control unit connected. Lead plug on altitude sensor disconnected. Switch on ignition:	9...11 mA	G 3
18	-	21	2/4	Starting enrichment	12 - 12	Control unit connected. Lead plug on altitude sensor disconnected. Switch on ignition. Continue pressing button 2. Pressing button 4 causes current to rise - in approx. 1 second - to:	80...100 mA	G 3
19	-	21	1/4	Post-start enrichment	12 - 12	Control unit connected. Lead plug on altitude sensor disconnected. Switch on ignition. Continue pressing button 1: Briefly press push-button 4 and release. Current increases to: After a brief time, cuts back to: Cutback time approx. 90 seconds.	51... 71 mA 130...150 mA 51... 71 mA	G 5

A16

Rapid diagnostic chart

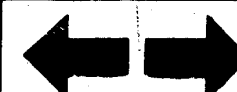
Audi 4000 four-wheel drive (USA)



A17

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)

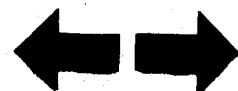


Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
20	-	21	1	Acceleration enrichment	12 - 12	Control unit connected. Switch on ignition: Continue pressing button 1. Value for current: Open the throttle valve somewhat, quickly deflect the air-flow sensor plate. Current rises to: Cuts back in approx. 1 second to:	51... 71 mA 130...150 mA 51... 71 mA	G 7
21	-	21	2	Overrun cutoff	12 - 12	Control unit connected. Reverse terminals on ammeter (interchange positive and negative.) Start the engine and hold at 1800...2000 min ⁻¹ . While pressing button 2, activate the idle throttle valve switch by hand. The engine hunts. Reading for current during the dropping speed phases: There must not be any overrun cutoff when the cruise control is switched on.	-40...-50 mA	G 9
22	-	24	-	Lambda closed-loop control	12 - 12 8 - 2	If the site of measurement is at an elevation greater than 600 m, disconnect the lead plug on the altitude sensor. Control unit connected. Start the engine. Warm it up, and operate it at idle speed. Closed-loop control operation of the lambda control can be identified from the pulsing of the reading for current. Average value: If average value is not within tolerance, make adjustment (idle-mixture-adjusting screw) to:	4 ... 16 mA 9 ... 11 mA	G 11

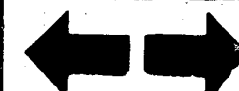
A18

Rapid diagnostic chart
Audi 4000 four-wheel drive (USA)



A19

Rapid diagnostic chart
Audi 4000 four-wheel drive (USA)



Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
22 (cont'd.)		24		Lambda closed-loop control - full load correction	12 - 12 8 - 2	Shut off the engine. Disconnect the lead plug on the altitude sensor. Switch on ignition. Reading for current: Open throttle valve fully. Current rises to:	9...11 mA 12...14 mA	G 11
23		22	-	Lambda closed-loop control - rich stop	12 - 12 8 - 2	Control unit connected. Lead plug on altitude sensor disconnected. Switch on ignition. Current rises to:	max. 22 mA	G 13
24		23	-	Lambda closed-loop control - lean stop	12 - 12 8 - 2	Control unit connected. Lead plug on altitude sensor disconnected. Switch on ignition. Current drops to:	Less than 2 mA	G 15
25	10	24	-	Idle speed control		Testing with lambda closed-loop control tester KDJE-P 600. Press button "IR". Jump black sockets 1 and 2 on the test adapter. Have engine at normal operating temperature and run it at idle. Idle speed (set by control): With on/off ratio: If need be, adjust the on/off ratio (bypass screw on the valve assembly).	$800 \pm 20 \text{ min}^{-1}$ $28 \pm 1\%$	G 17

A20

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)



A21

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)



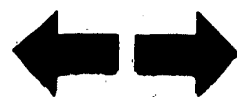
Rapid diagnostic chart for the universal test adapter ETT 018.01

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications (Reading)	For troubleshooting, see
	V	Ω						
25 (cont'd.)	10	24	See text	Idle speed control - correction functions		Press button 6 (corresponds to opening of the idle throttle valve switch). Engine speed: On/off ratio:	900...940 _{min} ⁻¹ 33 \pm 1%	G 19
						Switch on the air conditioner (compressor). Engine speed: On/off ratio:	900...940 _{min} ⁻¹ 33 \pm 1%	G 19
						Engine speed boost, engine cold. (Testing only with engine cold). Engine temperature less than +40°C:	980...1020 _{min} ⁻¹	G 19

A22

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)

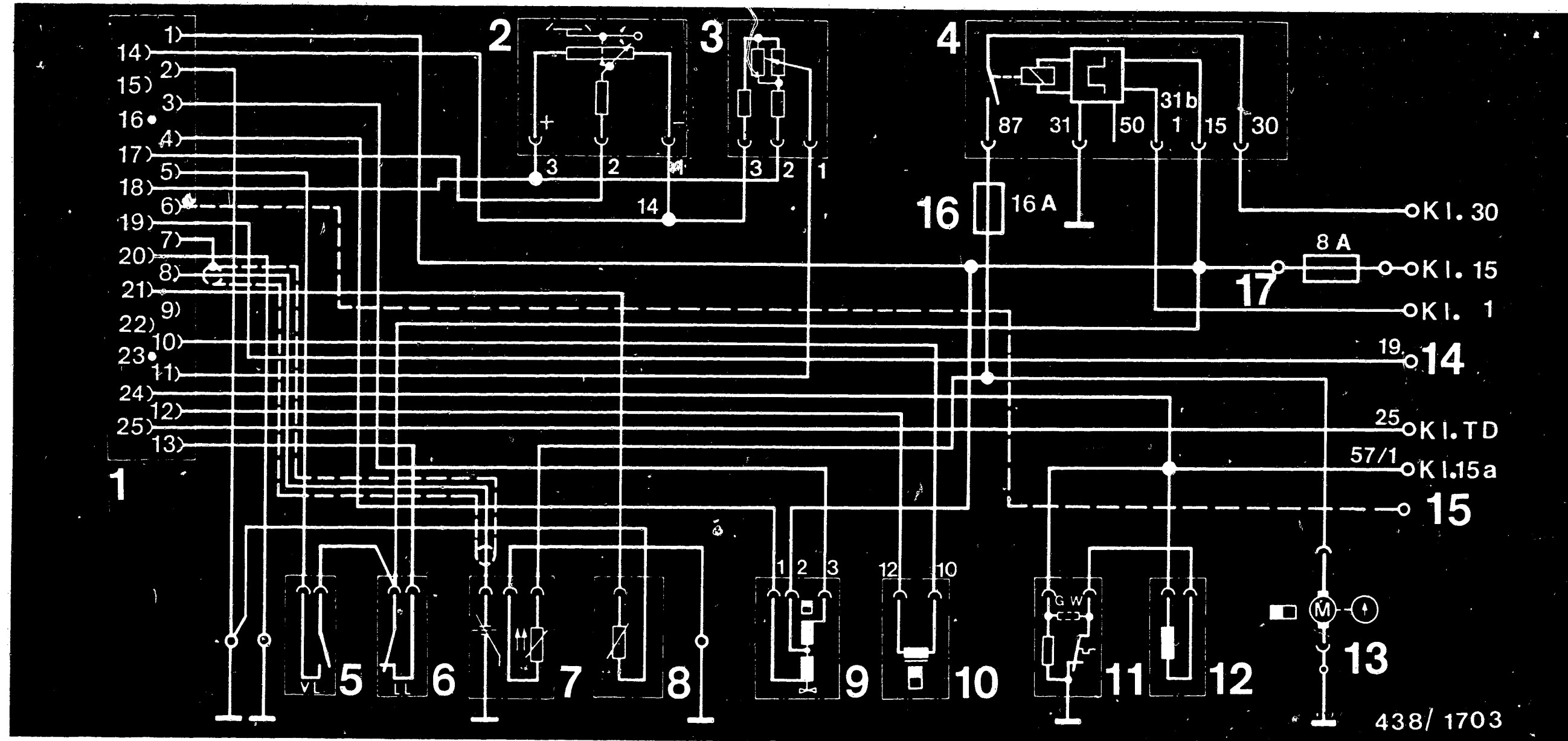


A23

Rapid diagnostic chart

Audi 4000 four-wheel drive (USA)





4. Electrical wiring diagram for the KE-Jetronic with a safety circuit:

- | | |
|---------------------------------------|---|
| 1 = Control unit | 9 = Idle actuator |
| 2 = Air-flow sensor potentiometer | 10 = Pressure actuator |
| 3 = Pressure sensor (altitude sensor) | 11 = Thermotime switch |
| 4 = Electronic speed relay | 12 = Cold-start valve |
| 5 = Full load throttle valve switch | 13 = Electric fuel pump |
| 6 = Idle throttle valve switch | 14 = Lead to the air conditioner |
| 7 = Lambda sensor with sensor heater | 15 = Connection for the cruise control |
| 8 = Temperature sensor (NTC) | 16 = Central-electrics console, fuse 13 |
| | 17 = Central-electrics console, fuse 24 |

B1

Electrical wiring diagram

Audi 4000 four-wheel drive (USA)



B2

Electrical wiring diagram

Audi 4000 four-wheel drive (USA)



Important information on electrical safety circuit:

The voltage supply for the electrical components in accordance with the above circuit diagram is in line with the series version. Accordingly, the safety circuit has to be jumpered for testing the electric fuel pump, the lambda sensor heater and for all pressure and fuel-delivery measurements. The components - control unit, idle actuator and throttle-valve switch - are supplied via terminal 15 (ignition switch) with the result that it is sufficient to switch on the ignition to test the above.

For a limited period following the start of series production of the Audi 4000 4-wheel drive all components were actuated via the electronic speed relay (pump relay). This means that the safety circuit also has to be jumpered for testing the control unit, the idle actuator, and the throttle-valve switch.

In case of doubt, the actual circuitry is therefore to be determined.

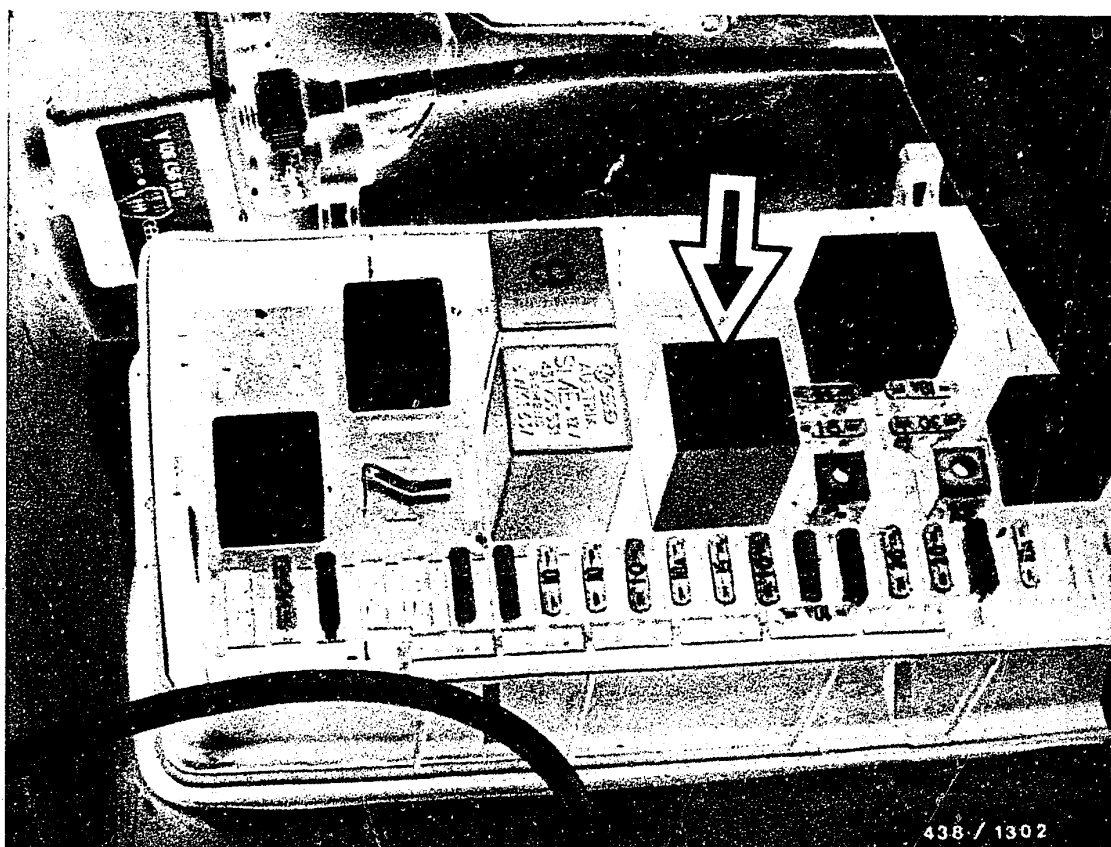
When performing trouble-shooting, attention should also be paid to the fuses indicated in the circuit diagram.

Please refer to the following coordinate for jumpering the safety circuit.

B3

Jumpering safety circuit
Audi 4000, 4-wheel drive (USA)





Jumpering electrical safety circuit:

The electronic speed relay is located in the central-electrics unit on the left in the direction of travel in the instrument housing, relay position 10.

To effect jumpering, remove relay and jumper the sockets 30 and 87 with auxiliary lead. Provide auxiliary lead with fuse element and fuse 16 A. Width of blade terminals 9.5 mm.

Important: jumpering means that the electric fuel pump always runs. When the pump is running, never lift the air-flow sensor plate as this causes fuel to be injected. The accumulation of fuel in the combustion chamber can lead to severe engine damage when subsequently actuating the starter. When effecting jumpering for purely electrical tests, disconnect pump for safety reasons.



6. General instructions

6.1 Introduction:

This microfiche card deals with all testing and repair jobs on the KE-Jetronic in the Audi 4000 four-wheel drive vehicle. All components of the KE-Jetronic are covered in the individual test sections, which also include the pertinent test specifications.

The KE-Jetronic is a further development of the well-known K-Jetronic, with, however, all the corrections required in practice being directed in this system by electronic circuits. To a large extent, the basic mechanical - hydraulic principle is the same as that of the K-Jetronic, but the separate control pressure circuit with the control pressure regulator (warm-up regulator) is not used.

In order to be able to perform the testing jobs described in this microfiche and to evaluate the components, you should be familiar with the KE-Jetronic and the way it operates.

Reference is made in this respect to the Technical Instruction 1987722021 and to the Service Information "KE-Jetronic System Versions".

For trouble-shooting on the KE-Jetronic, it is a prerequisite that the ignition is OK and that the engine is in proper mechanical order. The structure selected for the microfiche is such that in addition to these general remarks, lines A and B contain all the information required for a quick complete checking of the system by an experienced mechanic. In detail, these include:



- All mechanical, hydraulic and electrical test specifications.
- A chart of test steps for Bosch universal test adapter, to test all electrical/electronic operations.
- A listing of the test equipment and special tools needed, and presentation of the installation position of all components.

In each case, the test specifications and the test step chart contain reference to the coordinates at which each section of the test is described in detail.

The purpose of the trouble-shooting chart on coordinates C 1 to C 6 is to make it easier to determine the sections of the test to be run for certain defects. Select the possible cause from the trouble-shooting chart to correspond to the complaint by the customer or the problem you yourself have found. The indication of coordinates at the end of the column for causes refers to the appropriate test section containing all the necessary instructions.

6.2 Important instructions for general work on vehicles with the KE-Jetronic:

- Never start the engine unless the battery is firmly connected.
- Never disconnect the battery from the vehicle electrical system while the engine is running.



- Disconnect the battery from the vehicle electrical system when quick-charging it.
- Remove the KE-Jetronic control unit at temperatures above +80°C (paint-drying ovens).
- Remove the KE-Jetronic control unit during electrical welding work (e.g., spot welding).
- Make certain all wiring harness plugs are properly seated.
- Never connect or disconnect the wiring harness plug of the control unit while the engine is running or while the safety circuit is jumped.

6.3 Important instructions for work on the KE-Jetronic:

Whenever any fuel connections are taken apart, parts removed, including on the vacuum system, use, in principle, new seals and gaskets when reconnecting them or reinstalling them.

When working on the KE-Jetronic, be extremely neat and clean. In principle, clean the fuel connections thoroughly before taking them apart.

During testing with the electric fuel pump running, never deflect (raise) the sensor plate of the air-flow sensor, since that results in fuel being injected via the fuel-injection valves. This can cause extremely serious damage to the engine during a subsequent start of the engine.



6.4 Scope of the operations of the KE-Jetronic in the Audi 4000, four-wheel drive vehicle (5-Cyl.):

The following are accomplished by means of differential pressure control:

- Warm-up enrichment: Enrichment depending on the engine temperature. Cutback of enrichment at approx. +45°C.
- Start enrichment: Triggered at the start of starting motor operation, regardless of temperature. Enrichment period approx. 1.5 seconds.
- Post-start enrichment: Triggered when the starting motor is switched on. The amount and duration of enrichment does not depend on temperature. No enrichment function starting from approx. +70°C.
- Acceleration enrichment: Triggered with a positive change in load by the potentiometer in the air-flow sensor. How great the enrichment is depends on the engine temperature and on the steepness and size of the signal from the potentiometer. The cutback time is after approx. 1.5 seconds.



- Overrun cutoff and engine speed limitation:

During starting, with the throttle valve closed and with the engine temperature greater than $+80^{\circ}\text{C}$, acceleration enrichment is suppressed.

Overrun cutoff takes place with the throttle valve closed, with the engine speed thresholds being established dependent upon temperature. The cutoff speed for the speed limitation is at approx. 6500 min^{-1} . The hydraulic function is the same for overrun cutoff and for engine speed limitation.

- Altitude correction:

As altitude increases (decreasing air pressure), the mixture is adjusted by means of reducing the fuel delivery. Pickup for the air pressure using a separate pressure sensor with a potentiometer.

- Lambda closed-loop control:

Lambda closed-loop control, operating in the familiar manner. Switch-over to open-loop control under certain operating conditions.



- Idle speed control:

Idle speed control is an additional system. With this operation, there is no intervention in the fuel delivery by the differential pressure control, but instead engine speed is controlled by means of a separate idle actuator (instead of an auxiliary-air device). The idle actuator is electronically controlled and triggered by the KE-control unit.



7. Test equipment and tools

- Universal test adapter ETT 018.00 - 0 684 101 801
To test the electrical/electronic operations of the system.
- Test lead KE-Jetronic 1 684 463 135
Used in conjunction with the test adapter.
- Multimeter
Used in conjunction with the test adapter.
Commercially available (e.g., Misco Master 50 k).
- Pressure tester KDJE-P 100
To test all fuel pressures and to test for leaks in the system.
- Sets of connecting parts KDJE-P 100/10 and .../11
To connect up the pressure tester.
- Valve tester KDJE-P 400
To test the fuel-injection valves.

Testing medium: Testing gasoline

Bosch part number VS 14 942-CH
(formerly part number 5 973 340 650).
The Bosch testing gasoline can be
obtained in 5-liter drums from the
following vendor:

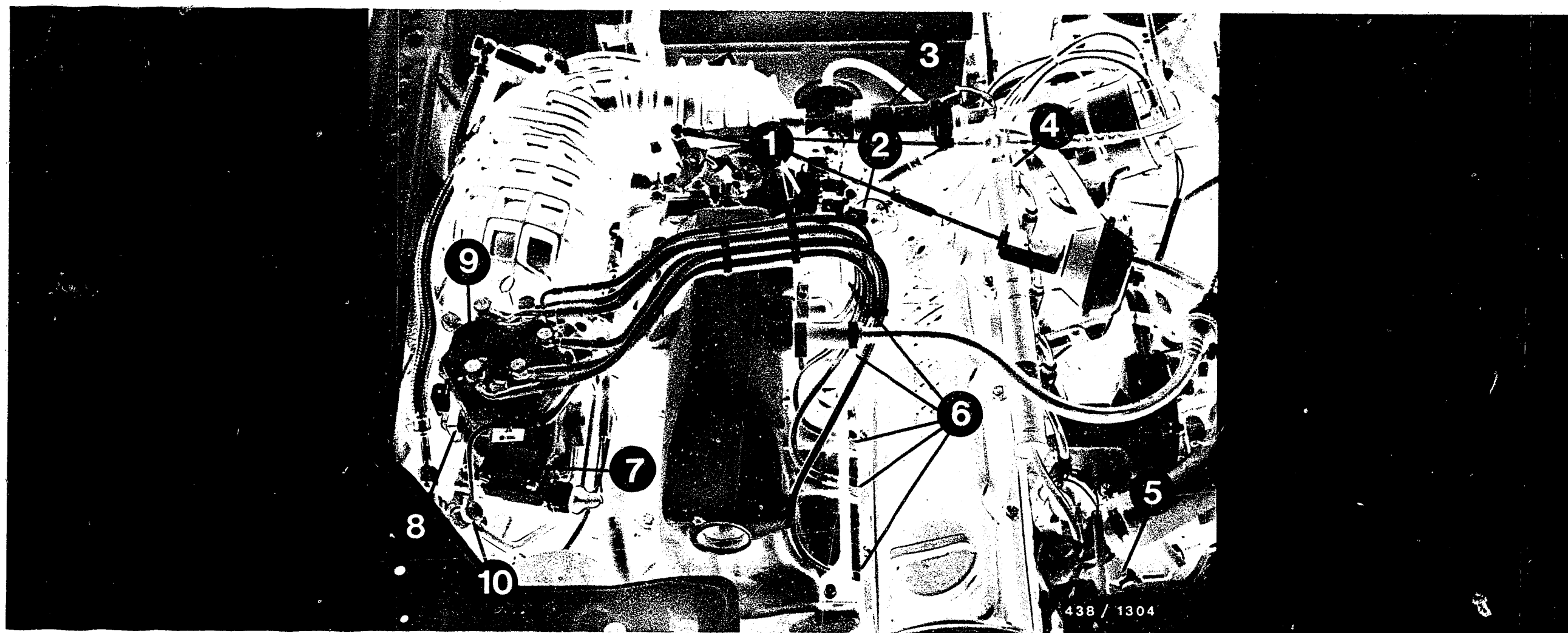
Oskar Gnam & Co
D-7531 Kämpfelbach-Bilfingen

- Lambda closed-loop control tester KDJE-P 600
For testing the idle speed control.



- Tester for comparison of fuel deliveries,
KDJE-P 200
For comparative measurement of the fuel deliveries from the individual outlets on the fuel distributor.
- 5 adapter sleeves KDJE-P 200/19
To connect the tester for comparison of fuel delivery to the fuel-injection valves with air-shrouding sleeves.
- Adjusting wrench KDEP 1035
For exhaust gas adjustment.
- Measuring glass, approx. 1.5 ltrs. capacity
Commercially available, for measurement of the fuel delivery from the electric fuel pump.
- Electrical connecting lead KDJE 7450/70
For direct connection to the components to be tested.
- Tachometer (commercially available)
- CO-analyzer (commercially available)
- Set of tools for removing and installing the CO-anti-tamper device in the air-flow sensor.
E.g. Tool kit No. 4521/7 from Hazet,
D-5630 Remscheid.





8. Installation position of the individual components

1 = Full load throttle valve switch.
The idle throttle valve switch (not visible in the illustration) is located on the underside of the throttle-valve assembly, near the cylindrical helical coiled spring for the throttle-valve shaft.

2 = Cold-start valve

3 = Idle actuator

4 = Thermotime switch, concealed, located on the rear face of the cylinder head.

5 = Temperature sensor (NTC)

6 = Fuel-injection valve(s)

7 = Electrohydraulic pressure actuator

8 = Potentiometer on the air-flow sensor

9 = Fuel distributor

10 = Pressure regulator (primary pressure)

B 15

Installation position of the components

Audi 4000 four-wheel drive (USA)

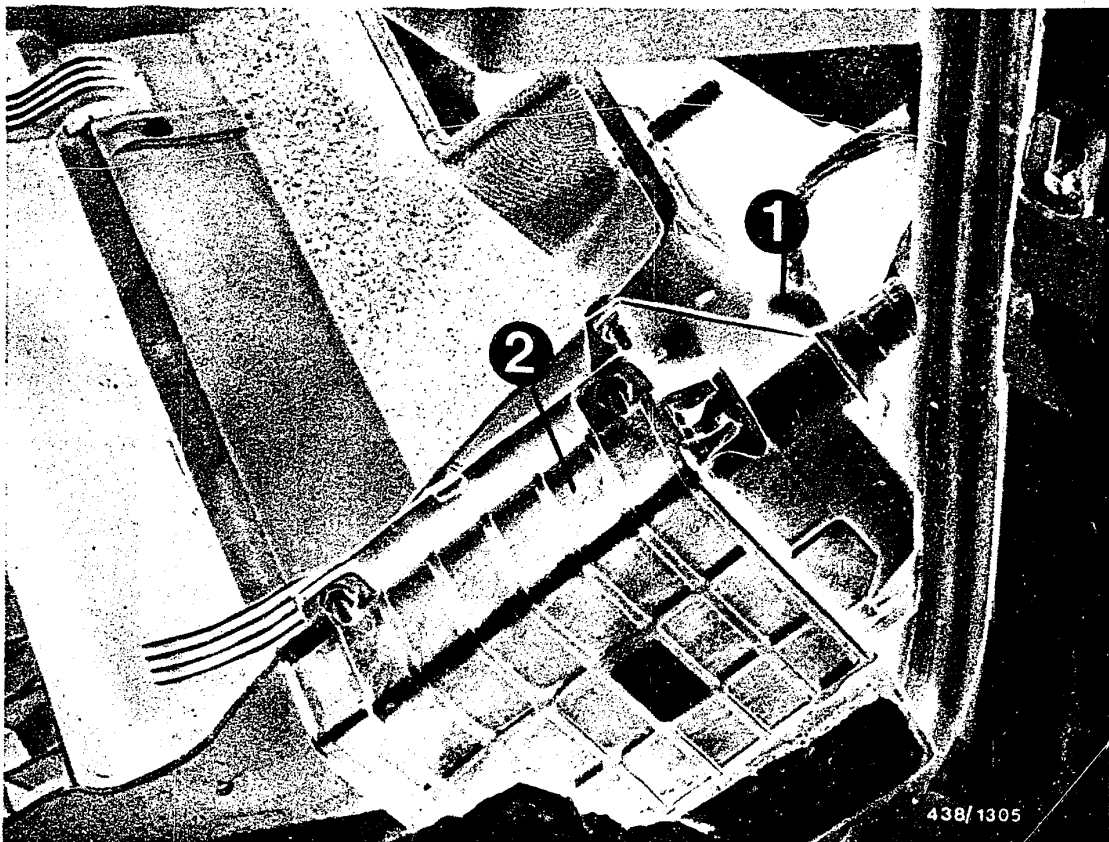


B 16

Installation position of the components

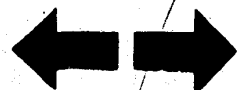
Audi 4000 four-wheel drive (USA)

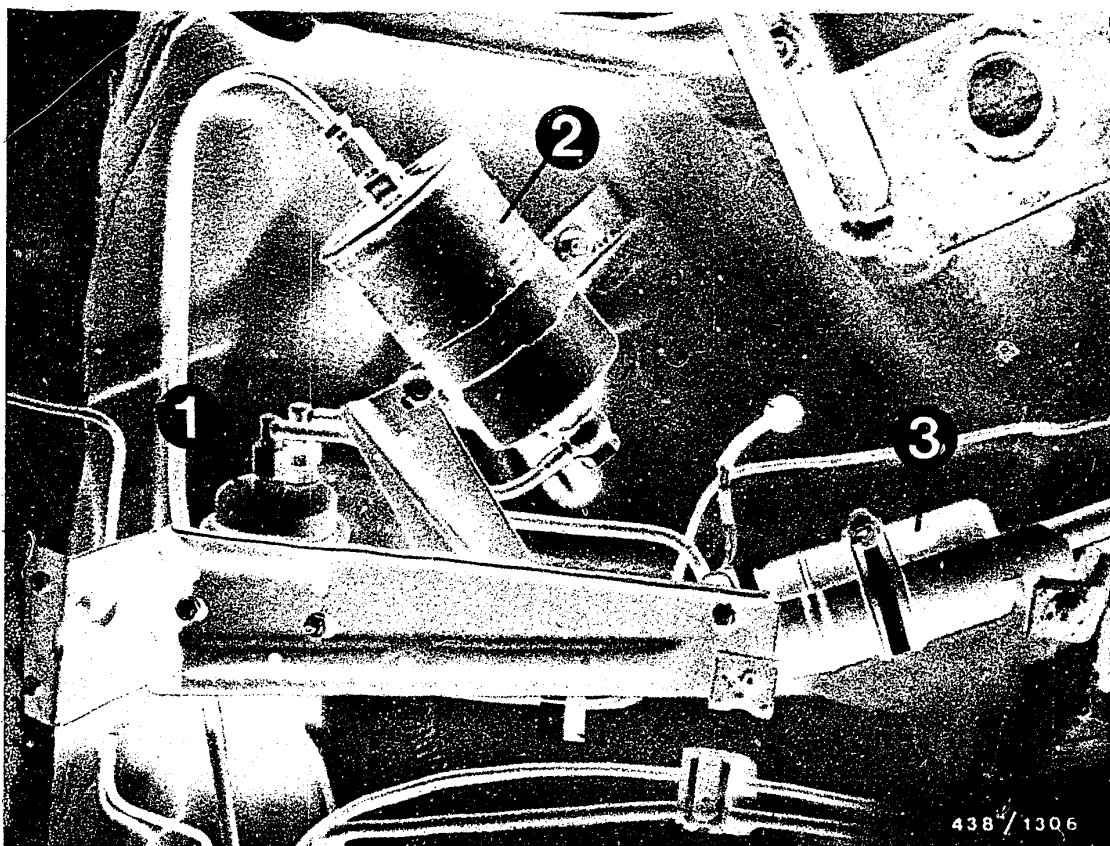




- 1 = Pressure sensor (altitude sensor, partially concealed)
 2 = Electronic control unit

The electronic control unit and the pressure sensor are located in the passenger compartment, under the dashboard on the right. Both components are fastened to the glove compartment and are accessible only after the glove compartment has been taken out.

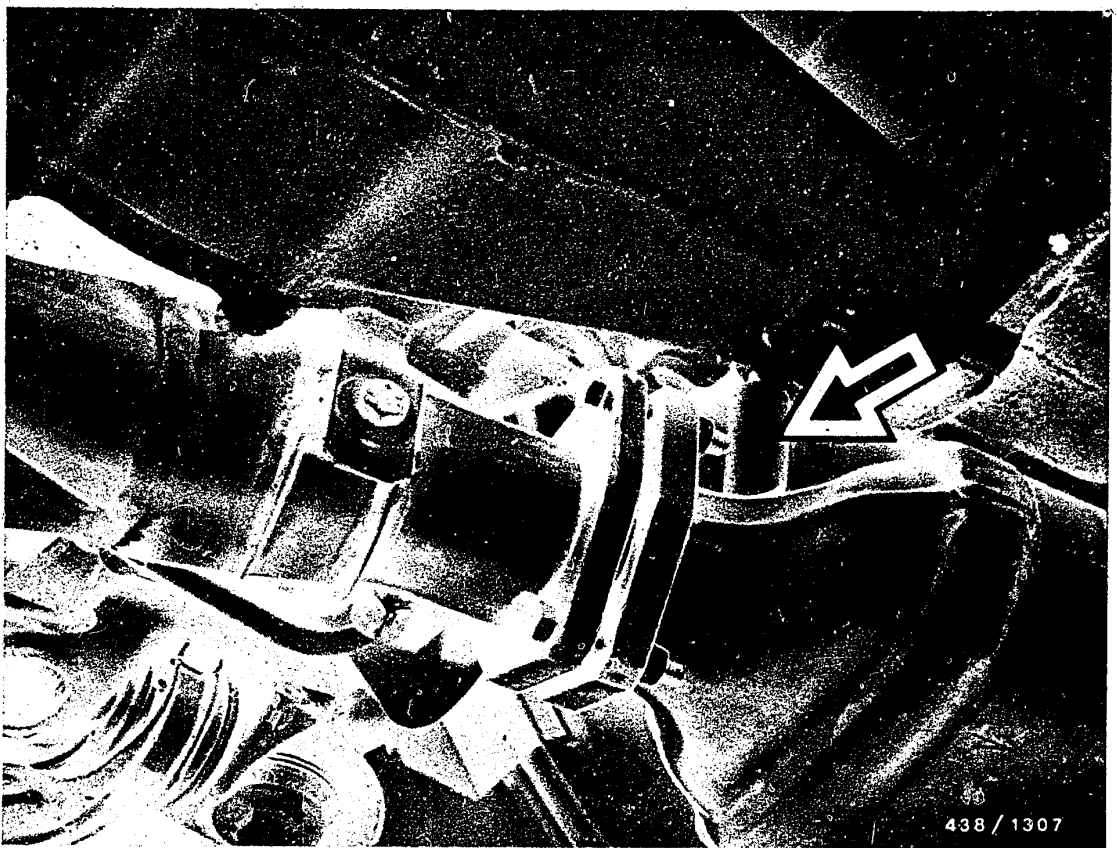




- 1 = Fuel accumulator
- 2 = Fuel filter
- 3 = Electric fuel pump

The components for the fuel supply system are located on the underside of the vehicle, in the area in front of the rear axle, on the left looking in the direction of forward vehicle travel.





The lambda sensor for the lambda closed-loop control is screwed into the exhaust system, on the inlet end of the catalytic converter (arrow).

Note:

Before installing a new sensor, coat its thread with special assembly paste VS 14 016 Ft (5 964 080 105). Make sure to coat only threads and that no paste gets into the slots on the protective sleeve.

B 19

Installation position of the components
Audi 4000 four-wheel drive (USA)



9. Trouble-shooting chart for the KE-Jetronic

Important instructions for the trouble-shooting chart below:

With respect to its operation, the KE-Jetronic differs in significant points from other well-known fuel-injection systems.

This makes necessary a structure for the trouble-shooting chart and a sequence for the individual test steps that are specific to the KE.

The trouble-shooting program below starts with a trouble-shooting chart (C3...C6) in which reference is made to the appropriate possible causes that correspond to the defect symptom (customer complaint).

In each cause column, reference is made to the first coordinate of the test step in which the testing of this operation is described in detail.

The trouble-shooting program has been structured in such a way that it is possible to carry out a targeted trouble-shooting with the defect being determined in principle in accordance with the trouble-shooting chart (C3...C6).

C1

Trouble-shooting chart

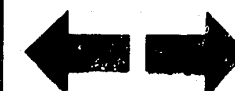
Audi 4000 four-wheel drive (USA)



C2

Trouble-shooting chart

Audi 4000 four-wheel drive (USA)



Customer complaint (defect symptom)

- Cause (component defect)

Coordinates

●	●				●	●	Electric fuel pump not functioning	C 21
	●	●	●	●			Engine air intake system leaking	C 7
●	●	●	●	●			Air-flow sensor control lever or control plunger not moving freely	C 9
	●						Incorrect position of the air-flow sensor plate	C 15
●							Cold-starting system defective	C 23
		●	●				Cold-starting valve leaking	C 23
●	●				●	●	Primary pressure not within tolerance	D 3
●	●	●	●		●	●	Differential pressure not within tolerance	D 7
	●						Fuel system as a whole leaking	D 17
	●	●	●				Fuel-injection valves leaking, opening pressure too low	E 3
		●	●		●	●	Uneven fuel delivery (variation in deliveries)	E 11
●	●	●	●	●			Idle control defective (idle speed control, lambda closed-loop control)	E 24
						●	Throttle valve does not open fully	- - -
●	●						"Starting enrichment" function not within tolerance	E 24
							"Post-start enrichment" function not within tolerance	E 24
●		●					"Warm-up enrichment" function not within tolerance	E 24
				●			"Acceleration enrichment" function not within tolerance	E 24
					●	●	"Full-load enrichment" function not within tolerance	E 24
●	●						"Idle" throttle valve switch incorrectly set.	G 21

C3

Trouble-shooting chart

Audi 4000 four-wheel drive (USA)



C4

Trouble-shooting chart

Audi 4000 four-wheel drive (USA)



Customer complaint (defect symptom)

8. Engine "diesels"

9. Poor mileage

10. Acceleration problems

11. Idle speed incorrect or unstable

12. Engine starts, but then dies

Cause (component defect)

Coordinates

				Electric fuel pump not functioning	C 21
		●	●	Engine air intake system leaking	C 7
●		●		Air-flow sensor control lever or control plunger not moving freely	C 9
●				Incorrect position of the air-flow sensor plate	C 15
●			●	Control plunger seal (idle travel of air-flow sensor plate) incorrectly set	C 15
●	●			Cold-start valve leaking	C 23
			●	Primary pressure not within tolerance	D 3
	●	●	●	Differential pressure not within tolerance	D 7
●				Fuel-injection valves leaking, opening pressure too low	E 3
	●	●	●	Uneven fuel delivery (variation in delivery)	E 11
		●	●	Idle control defective (idle speed control, lambda closed-loop control)	E 24
				"Starting enrichment" function not within tolerance	E 24
			●	"Post-start enrichment" function not within tolerance	E 24
		●	●	"Warm-up enrichment" function not within tolerance	E 24
		●		"Acceleration enrichment" function not within tolerance	E 24
		●		"Full load enrichment" function not within tolerance	E 24
		●		"Idle" throttle valve switch incorrectly set	G 21

C5

Trouble-shooting chart

Audi 4000 four-wheel drive (USA)

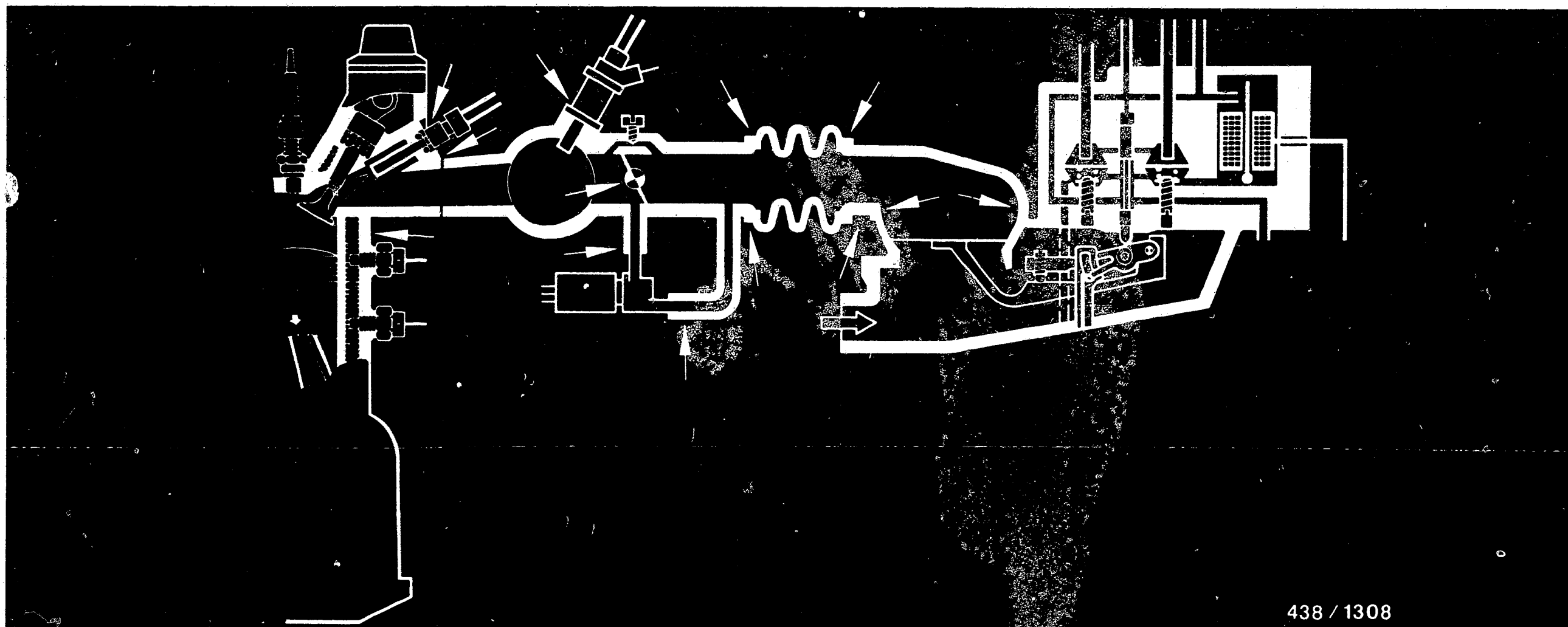


C6

Trouble-shooting chart

Audi 4000 four-wheel drive (USA)





438 / 1308

10. Checking the engine air intake system for leaks

The arrows in the picture show the typical locations at which leaks can occur. Check by visual inspection or, if not certain, as follows: Disconnect the hose at the outlet from the auxiliary-air device and using a compressed air gun, blow air through this hose into the air path. In so doing fully open the throttle valve. Brush joints with soapy water or spray with a leak detector (e.g., Gúpoflex).

It is not permissible under any circumstances to use combustible fluids to test for leaks.

Bubbling or foaming indicates leaks.

When a leak has been corrected, adjust the idle afterwards with the engine at normal operating temperature.

The idle adjustment is described at coordinates G 21.

C7

Testing air intake system for leaks
Audi 4000 four-wheel drive (USA)



C8

Testing air intake system for leaks
Audi 4000 four-wheel drive (USA)



11. Checking the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

Note: The air-flow sensor plate must be flat (not bent) and must be able to pass through at the narrowest point in the air funnel without making contact.

11.1 Preparations:

- Engine temperature not less than +20°C.
- Remove the air box so that the sensor plate in the air-flow sensor is accessible.
- Switch the electric fuel pump on for a few seconds by jumping the electric safety circuit, so that the control plunger is subjected to pressure.
To jump, connect the connection sockets 30 and 87 in the relay plate using an auxiliary lead.

11.2 Checking the control lever for ease of movement:

Raise the air-flow sensor plate by hand and let it go. The sensor plate returns to its zero position and jumps approximately two more times from the spring-loaded stop. If the control lever does not move freely, first release all fastening screws for the air-flow sensor, in order to determine whether this is due to distortion from the clamping of the housing. If the problem in ease of movement is corrected by releasing the fastening screws, take out and replace the gasket between the air filter housing and the air-flow sensor (Audi service part).

Caution: Do not crimp the fuel lines!

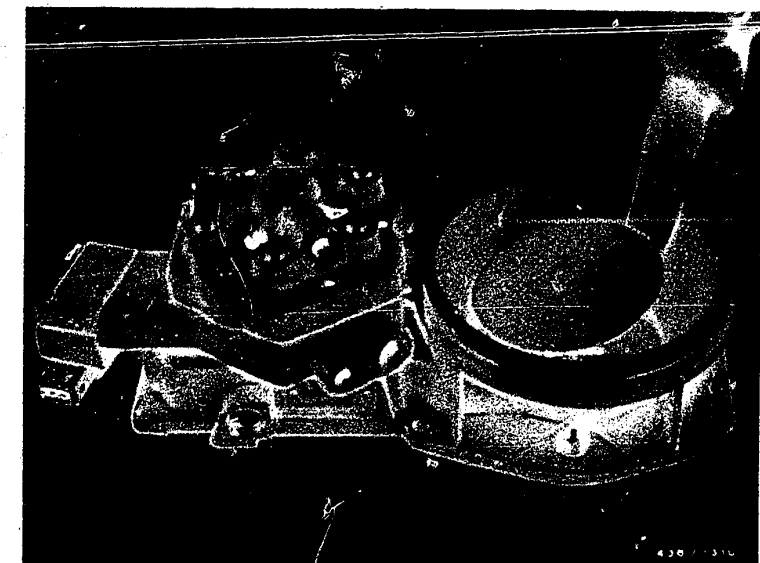
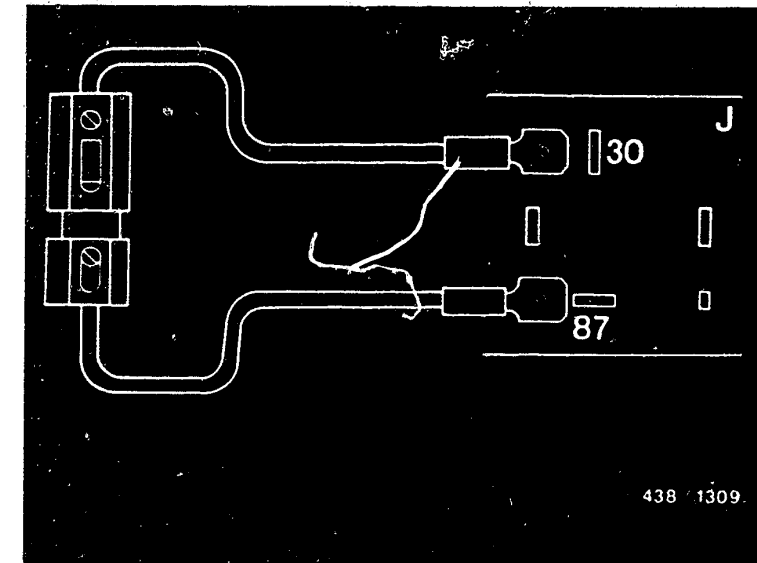
Caution: When putting in the air-flow sensor, do not apply any sealing compound between the seal surfaces.

Tightening torque for the air-flow sensor fastening screws:

9...10 Nm.

If distortion from clamping of the housing is not the reason for the lack of easy movement, take out and replace the air-flow sensor.

Note: It is not possible to repair the control-lever bearings on the KE-Jetronic air-flow sensor.



C9

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



C10

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



11.3 Checking the control plunger for ease of movement:

Raise the air-flow sensor plate by hand. The same resistance must be felt across the entire distance traveled.

Quickly move the air-flow sensor plate back up to just before the zero stop. The control plunger follows slowly, and must now be felt to come up against the air-flow sensor plate lever.

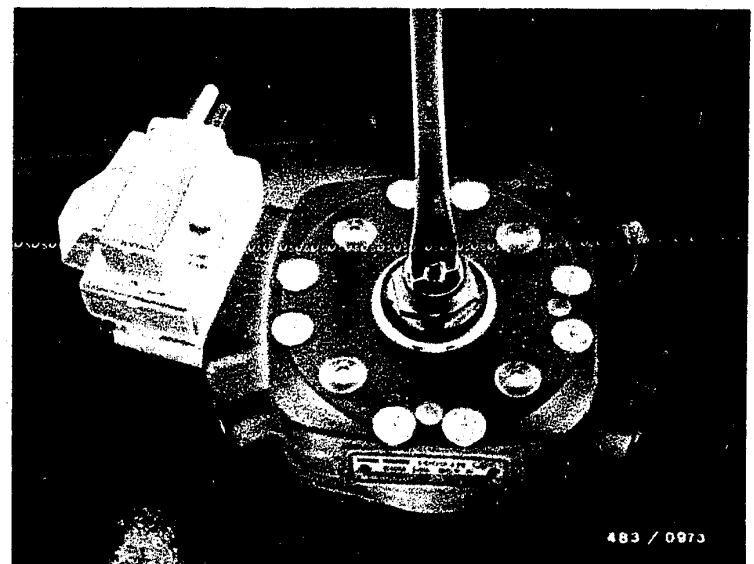
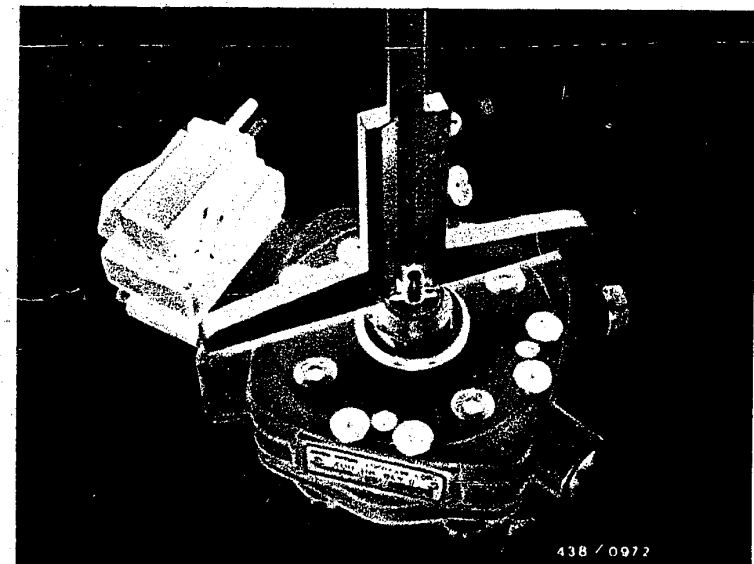
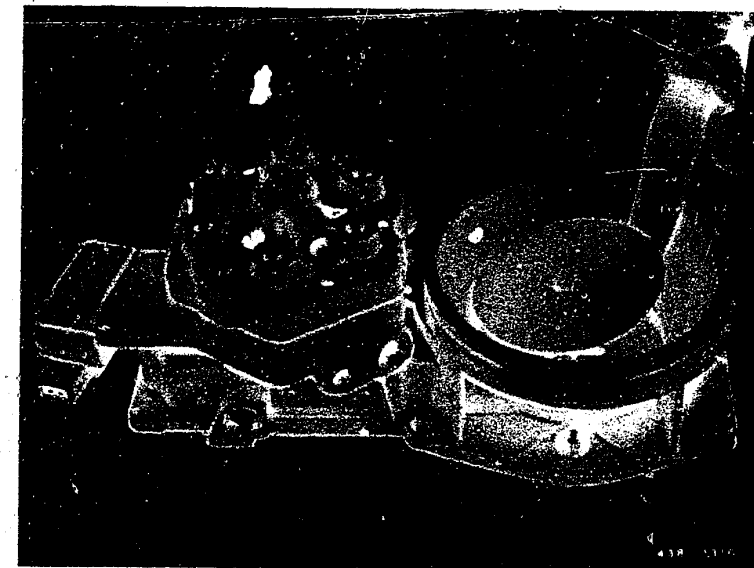
If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor. Thoroughly clean the fuel distributor in the area near the fuel connections. Unscrew all connections. When releasing, and when later tightening the fuel connections, hold the fixed hex of the components with a wrench. Unscrew the three fastening screws, and take the fuel distributor off the air-flow sensor.

Using a depth gauge, measure the position of the slotted round nut for the lower piston seal with respect to the fastening nut for the barrel with metering slits, and note it down for later reinstallation. In addition, mark the rotational position of the slotted round nut. Unscrew the slotted round nut using a shoulder screwdriver and take out the control plunger.

Clean the plunger thoroughly with washing gasoline or the like. If the plunger has severe striation or if no ease of movement can be attained by means of cleaning, take out and replace the entire fuel distributor. It is not permissible to clean the control plunger by mechanical means.

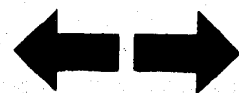
After the control plunger is put into the fuel distributor, screw in the slotted round nut for the lower plunger seal as far as the position determined on removal, and turn it as far as the mark that was made.

Put the fuel distributor back on the air-flow sensor. In so doing, insert a new gasket ring between the air-flow sensor and the fuel distributor. Maintain exactly the tightening torque for the three fastening screws on the fuel distributor (3.2...3.8 Nm).



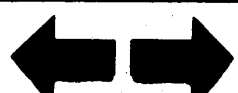
C11

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



C12

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



11.4 Additional instructions for the mechanical adjustment of the mixture-control unit:

Because of the lower control plunger seal in the KE fuel distributor, it is not permissible, if the overall setting of the mixture-control unit is correct, for the control plunger to rest up against the needle bearing of the air-flow sensor plate intermediate lever. The air-flow sensor plate control lever must have a free travel between its zero position (at rest position for the air-flow sensor plate and contact with the control plunger). In the center of the air-flow sensor plate with the electric fuel pump running, this should be 1 ... 2 mm.

A correct overall setting of the mixture-control unit means:

- Zero position of air-flow sensor plate correctly set (see label on air-flow sensor plate for test specification). Test zero position as follows: hold air-flow sensor plate in basic setting (if necessary, from below through air-filter housing).

Definition of the basic setting: Upper edge of the air-flow sensor plate flush with the transition edge from the cylindrical area to the air funnel (Fig.). Visual inspection on the outside of the air funnel.

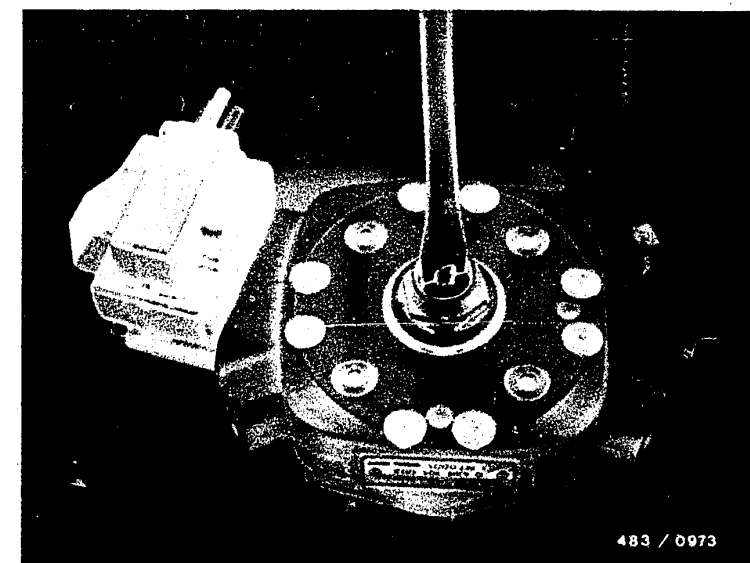
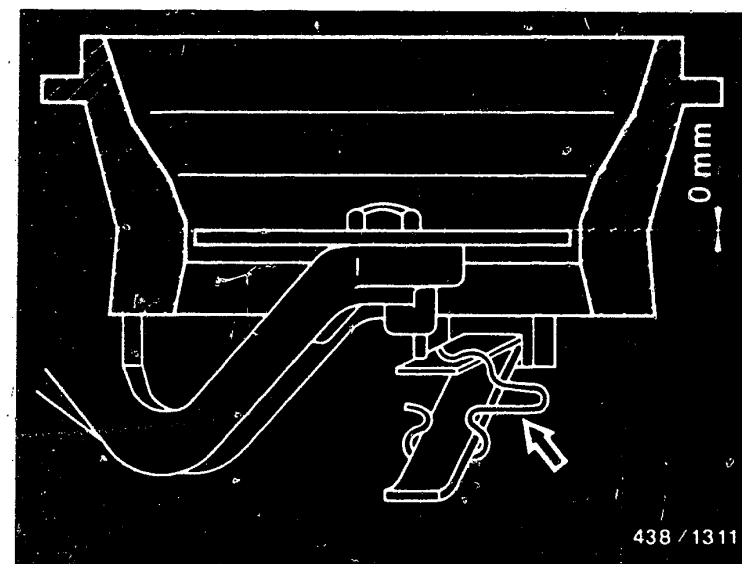
In this basic setting, measure the distance from the upper edge of the air funnel to the center of the fastening screw using a depth gauge.

Then lower air-flow sensor plate until it rests on leaf spring. The zero position determined by the leaf spring should be lower than the basic setting by the dimension indicated on the label for the air-flow sensor plate (leaf spring with shaped spring = 1.9 ... 2.5 mm; leaf spring with adjusting screw = 1.9 ... 3.0 mm). If necessary, correct zero position by bending shaped spring (arrow) or by adjusting the adjusting screw.

- Idle adjustment of the engine OK (Coordinates G 21).

If the required idle travel is not in the range from 1 ... 2 mm even though the air-flow sensor plate position is correct and the idle adjustment is correct, take the fuel distributor back off and correct the slotted round nut for the lower plunger seal, and with that, the position of the plunger.

Note: Screwing the slotted round nut in by 0.1 mm increases the idle travel at the center of the air-flow sensor plate by approx. 0.7 mm, and vice versa. Then recheck the idle adjustment and if need be correct it.



C13

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



C14

Air-flow sensor/fuel distributor
Audi 4000 four-wheel drive (USA)



12. Centering and zero position for the air-flow sensor plate

12.1 Centering the air-flow sensor plate

Check that the air-flow sensor plate is flat (not bent) and can pass through the narrowest point of the air funnel without making contact. If need be, center the air-flow sensor plate using locking ring KDEP 1040/10 (diam. 80 mm) as follows:

Release the air-flow sensor plate fastening screw. Put in the locking ring, holding the fastening screw with a pliers so that air-flow sensor plate does not slip out downward.

With the locking ring inserted, tighten the fastening screw to a torque of 5.0...5.5 Nm, release it again, and then tighten it again to the same tightening torque. When tightening the screw, make certain that the air-flow sensor plate is in its zero position (in the cylindrical portion of the air funnel).

It must no longer be possible to turn the air-flow sensor plate by hand.

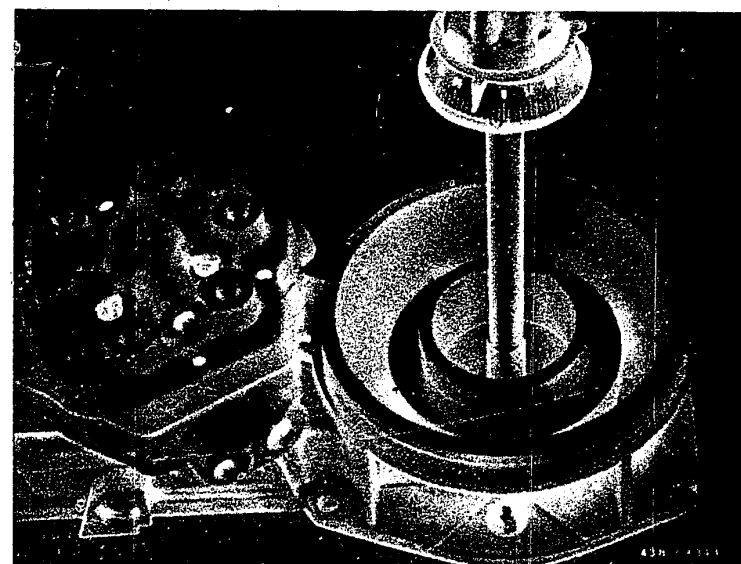
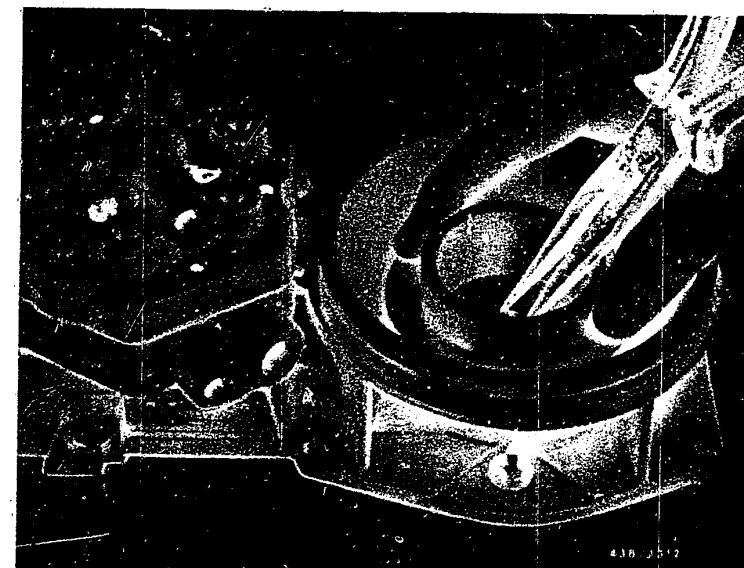
Important instruction for the air-flow sensor plate fastening screw:

In order to secure the screw, it has been microencapsulated at the factory and is therefore difficult to release and turn. Do not use force to release a screw that is very tightly seated, but warm it slightly using a soldering iron.

NO OPEN FLAME!

If the screw is very easy to turn after having been released several time, unscrew it, clean it, and coat it with a little screw locking compound (e.g., Loctite). In so doing, coat only a few turns of thread, so that it can be unscrewed again later.

After the screw has been tightened to the prescribed tightening torque, it must no longer be possible to turn the air-flow sensor plate by hand.



C15

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)



C16

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)



12.2 Checking and adjusting the position of the air-flow sensor plate (zero position):

The point of departure for determining the zero position of the air-flow sensor plate is the basic setting of the air-flow sensor plate.

Hold the air-flow sensor plate in its basic setting (if need be, from below through the air filter housing).

Definition of the basic setting: Upper edge of the air-flow sensor plate flush with the transition edge from the cylindrical zone to the air funnel (Fig.).

Visual inspection on the outside of the air funnel.

In this basic setting, measure the distance from the upper edge of the air funnel to the center of the fastening screw using a depth gauge.

Then lower air-flow sensor plate until it rests on leaf spring. The zero position determined by the leaf spring should be lower than the basic setting by the dimension indicated on the label for the air-flow sensor plate (leaf spring with shaped spring = 1.9 ... 2.5 mm; leaf spring with adjusting screw = 1.9 ... 3.0 mm). If necessary, correct zero position by bending shaped spring (arrow) or by adjusting the adjusting screw.

12.3 Adjustment of the lower plunger seal in the fuel distributor:

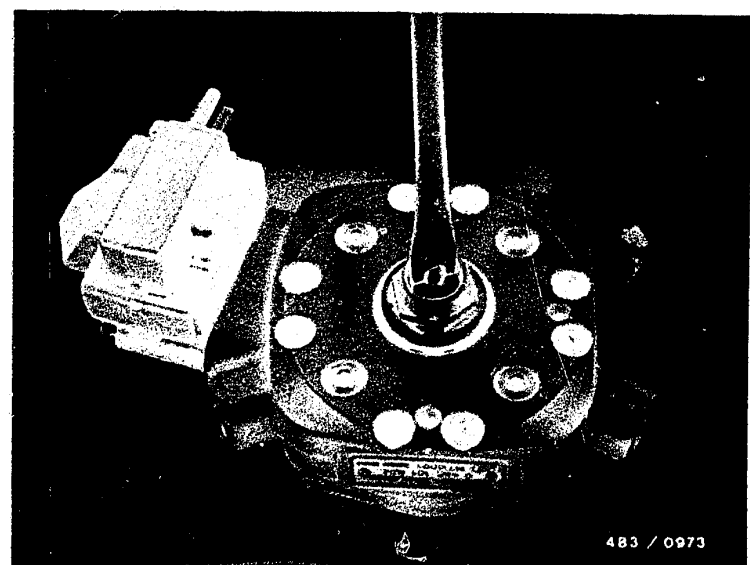
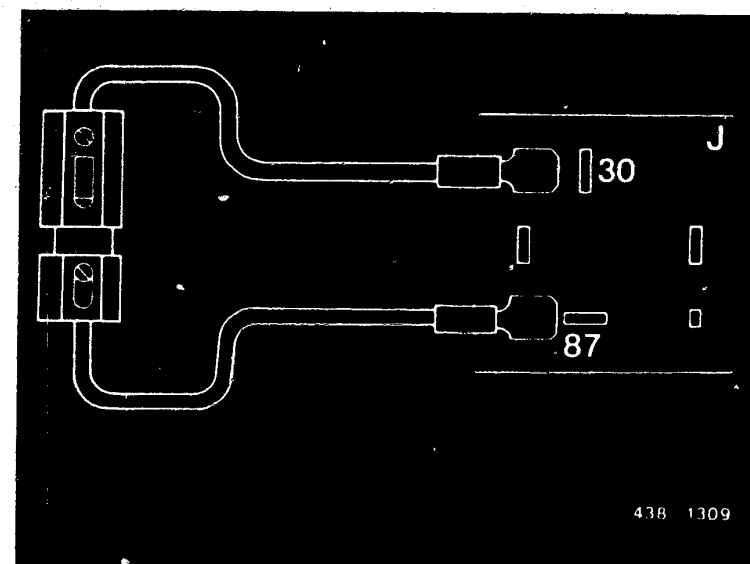
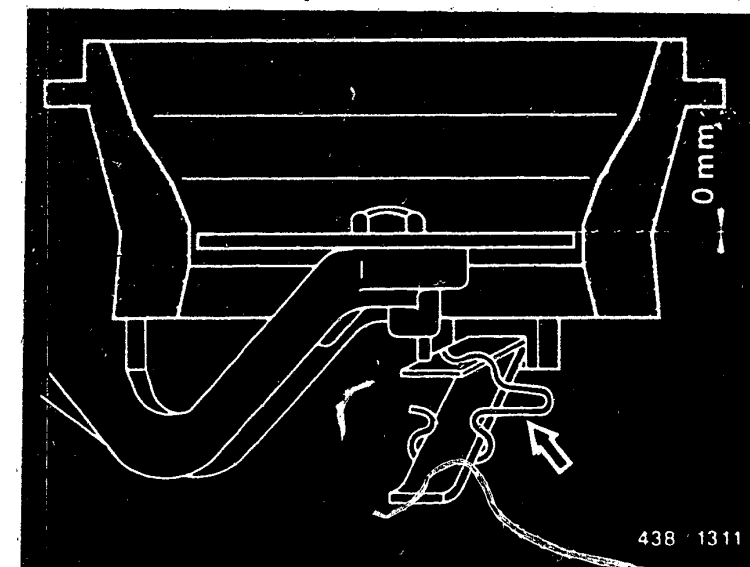
Switch the electric fuel pump on by jumping the electrical safety circuit so that the control plunger is subjected to pressure.

To jump, connect sockets 30 and 87 in the relay plate with an auxiliary lead.

If the zero position of the air-flow sensor plate is correctly adjusted, it is now not permissible for the control plunger to lie up against the needle bearing in the air-flow sensor plate intermediate lever. As a check, raise air-flow sensor plate somewhat. The air-flow sensor plate lever must have an idle travel between its zero position and the point of contact with the control plunger. This idle travel is to be 1 ... 2 mm.

For correction, take off the fuel distributor, and screw the slotted round nut for the plunger seal appropriately further in or out.

Changing the depth to which the nut is screwed in by 0.1 mm produces approx. 0.7 mm at the center of the air-flow sensor plate.



C17

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)



C18

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)



Special case:

If ever the slotted round nut for the plunger seal and the idle-mixture-adjusting screw in the air-flow sensor should simultaneously be out of position by an unknown amount, the idle travel can under some circumstances be completely eliminated or be far too great. In that case, an adjustment can be made as follows:

Remove the fuel distributor and turn the slotted round nut back flush with the collar on the hex nut.

Using a depth gauge, measure the distance on the air-flow sensor from the fuel distributor support (threaded eyelets) to the needle bearing in the control lever, and adjust it to 21.3 ± 0.1 mm by adjustment of the idle-mixture-adjusting screw. Put the fuel distributor on. There is now no idle travel.

Have the engine warm up, and adjust the idle (Coordinates G 21).

Take the fuel distributor back off, and screw the slotted round nut approx. 0.6 mm further in. Put the fuel distributor back on, connect only the fuel supply line, the two returns, and the starting valve line.

With the electric fuel pump running, check the idle travel, and if need be, take the fuel distributor back off and correct the slotted round nut appropriately.

Note: Changing the depth to which the slotted round nut is screwed in by 0.1 mm produces approx. 0.7 mm at the center of the air-flow sensor plate.

Then connect all lines to the fuel distributor. Recheck the idle adjustment and if need be correct it (Coordinates G 21).

C19

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)

**C20**

Checking/adjusting air-flow sensor plate
Audi 4000 four-wheel drive (USA)



13. Checking the operation of the electric fuel pump

13.1 Measuring point:

Useful information about the operation of the electric fuel pump is obtained only from a measurement of the fuel delivery against pressure, i.e., against primary pressure. For that reason, this test is done at the return connection from the pressure regulator (Figure at top - arrow).

Unscrew the fuel return line from the pressure regulator. In so doing, hold the fixed hex on the pressure regulator with a wrench. Connect a hose with a ball connection M 14 x 1.5 to the return connection on the pressure regulator. Hold the hose in the measuring glass for testing.

13.2 Testing:

Switch the electric fuel pump on for exactly one second by jumping the safety circuit. and measure the fuel delivery in the measuring glass.

Jumping the safety circuit: Connect connection sockets 30 and 87 in the relay plate using an auxiliary lead.

13.3 Test specification for measurement of the fuel delivery: Minimum delivery = 1300 cm³/min.

13.4 Possible causes for too low a fuel delivery:

Power supply to the electric fuel pump not OK, voltage drop. Minimum voltage required at the connection terminals with the electric fuel pump running: 11.5 V.

Fuel filter severely fouled.

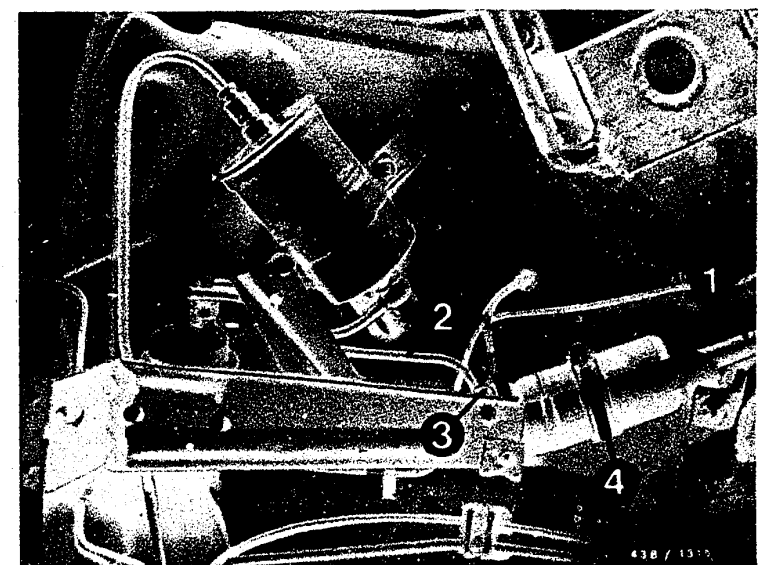
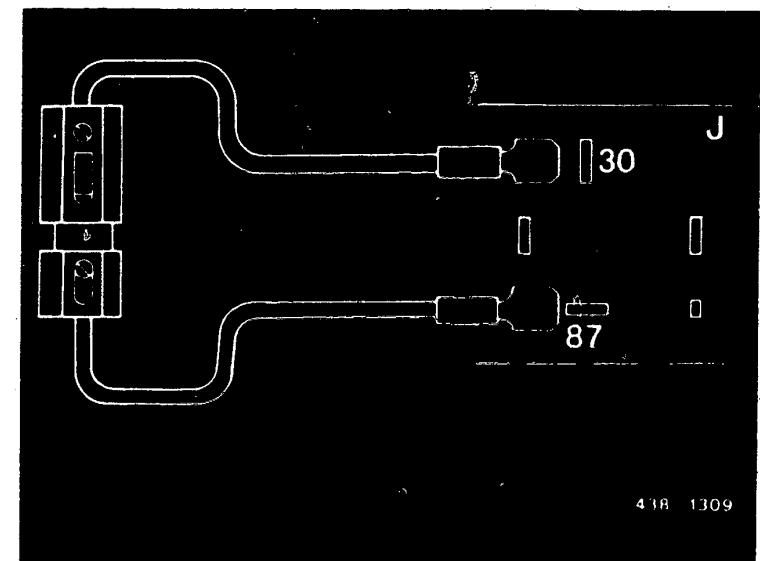
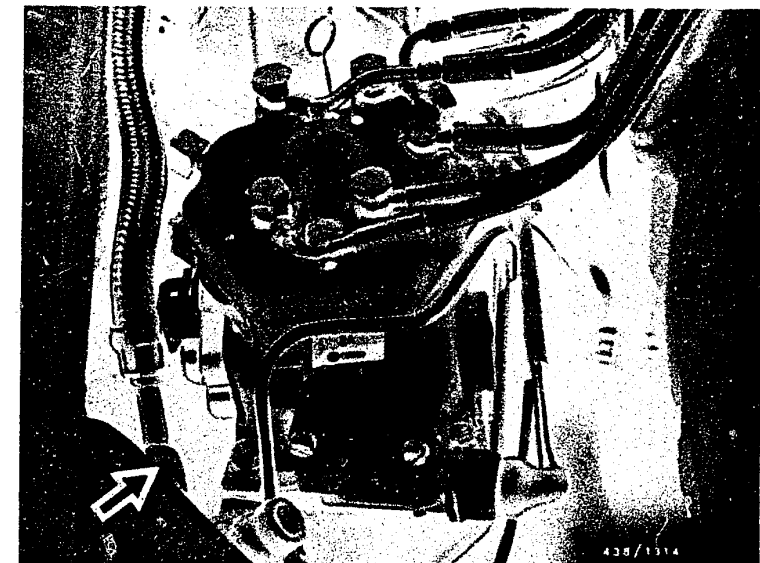
If these points are OK, the cause of the problem lies in the electric fuel pump itself. Take out and replace the electric fuel pump.

13.5 Taking out and putting in the electric fuel pump and the fuel filter:

Crimp off the fuel intake hose (1) (e.g., using crimper W 157 from Matra) in order to prevent fuel from escaping from the fuel tank. Release the hose clamps and disconnect the intake hose from the pipe. Catch any residual fuel that flows out. Likewise unscrew the delivery line (2) on the delivery pipe of the electric fuel pump, and in so doing catch any residual fuel that flows out. Disconnect electrical connections (3). Release the fastening strap (4) and take out the electric fuel pump.

Put in in the reverse order.

Taking out and putting in the fuel filter is done similarly. Here it is absolutely necessary to hold the fixed hex of the filter with a wrench when releasing or tightening the fuel lines.



C21

Testing electric fuel pump

Audi 4000 four-wheel drive (USA)



C22

Testing electric fuel pump

Audi 4000 four-wheel drive (USA)



14. Checking the cold-start system (thermotime switch, cold-start valve):

14.1 Thermotime switch:

Remove the thermotime switch for testing. It is located on the rear face of the cylinder head, in the area beneath the ignition distributor (concealed in the Figure). Remove only with engine cold, because some coolant escapes. The amount escaping would be greater with the engine warm. Catch the coolant.

The switching temperature $+15^{\circ}\text{C}$ and the switching time at -20°C of 8 seconds are stamped in on the hex of the thermotime switch. After removal, the thermotime switch is tested with an ohmmeter against the values below. It is cooled to less than 0°C in the cooling chest.

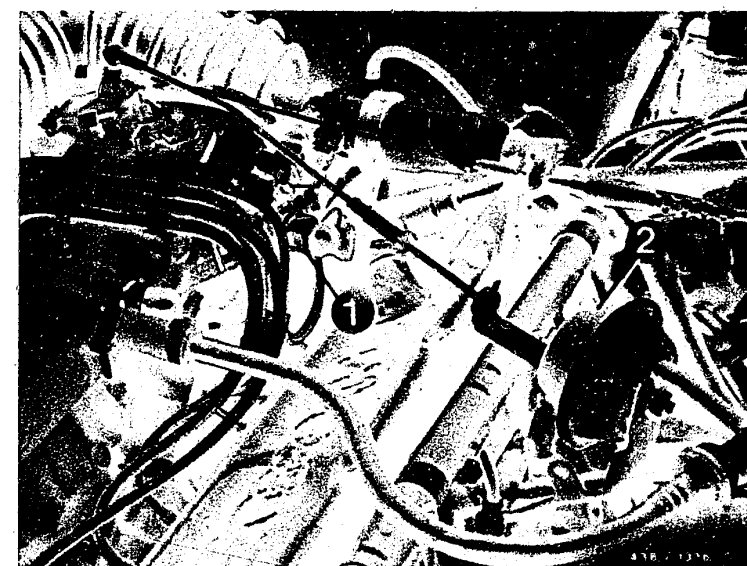
At a temperature below $^{\circ}\text{C}$	above $^{\circ}\text{C}$	Measurement of resistance between		
		Term. "G" and ground (housing)	Term. "W" and ground (housing)	Term. "G" and "W"
+10		50...70 Ω	0 Ω	50...70 Ω
	+20	50...70 Ω	$\infty \Omega$	$\infty \Omega$

14.2 Cold-start valve:

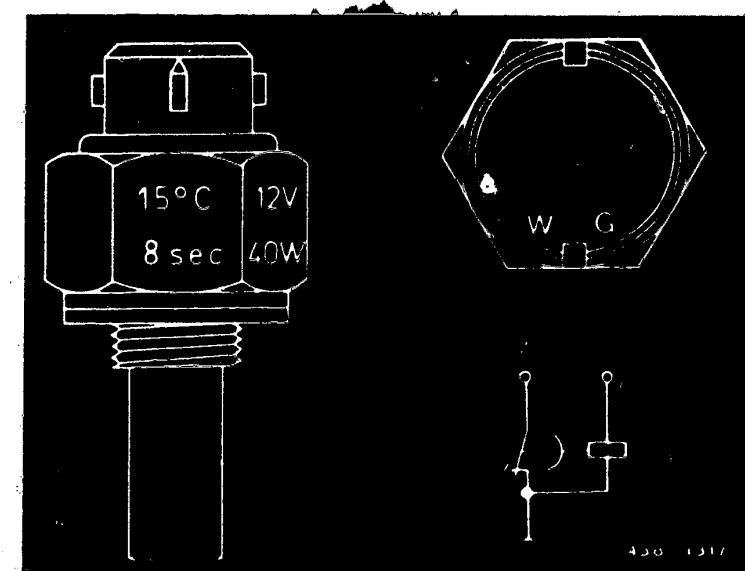
For testing, take out the cold-start valve; the fuel line remains connected. Using connecting lead KDJE 7450/70, connect the valve directly to ground and Terminal 15 (e.g., connecting socket Term. 15 in the relay plate).

Caution:

Do not connect the starting valve directly to B+. Fire hazard due to sparking.



1 = Cold-start valve
2 = Thermotime switch
(concealed)



C23

Checking cold-start system
Audi 4000 four-wheel drive (USA)



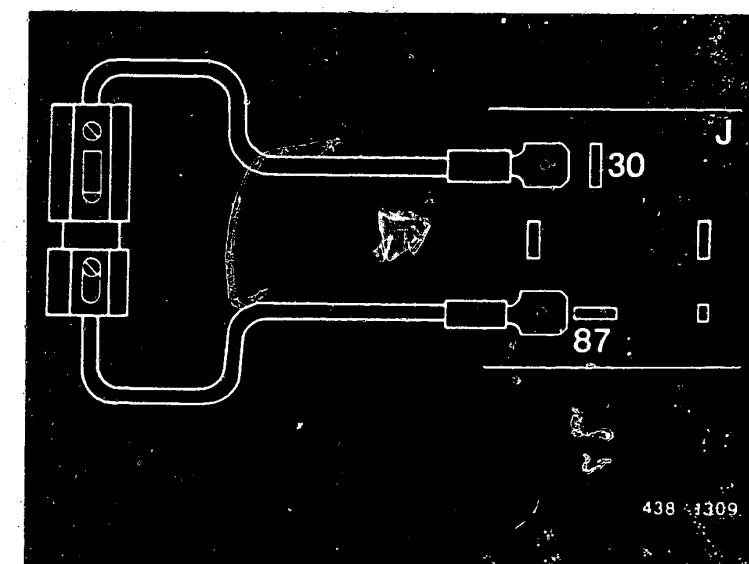
C24

Checking cold-start system
Audi 4000 four-wheel drive (USA)



Test procedure:

Switch the electric fuel pump on by jumping the electrical safety circuit. To do so, jump connecting sockets 30 and 87 in the relay plate using an auxiliary lead.



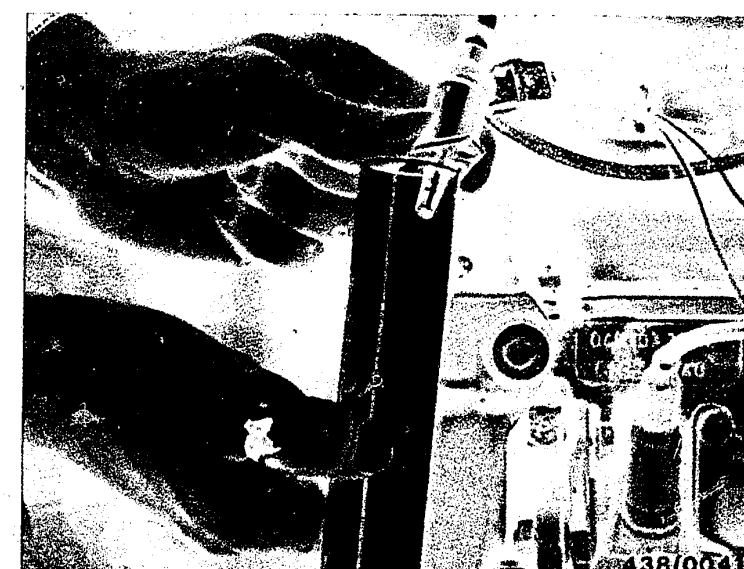
Hold the starting valve in the measuring glass and switch the ignition on. The valve must spray with a fine atomization and a uniform cone.

Switch the ignition back off and dry off the nozzle on the starting valve. Remove the connecting lead.

It is now not permissible for any dripping to occur within a minute. The starting valve must not leak even when shaken or pounded.

Then switch the electric fuel pump back off. Take out and replace a starting valve that does not open or leaks.

If it has been necessary to take out and replace the cold-start valve, recheck the idle adjustment and if need be correct it (Coordinates G 21).



D1

Checking cold-start system

Audi 4000 four-wheel drive (USA)



D2

Checking cold-start system

Audi 4000 four-wheel drive (USA)



15. Pressure measurements

15.1 Primary pressure:

Attaching pressure tester KDJE-P 100:

Attachment using connecting part sets KDJE-P 100/10 and .../11.

Important instructions:

There are two special measuring connections on the fuel distributor for connecting the pressure tester. These are sealed with screw plugs. (Arrows, photo at top)

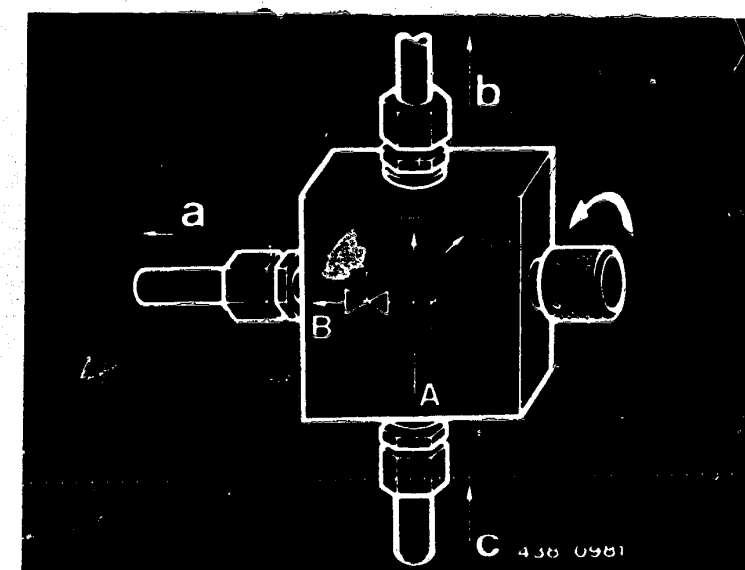
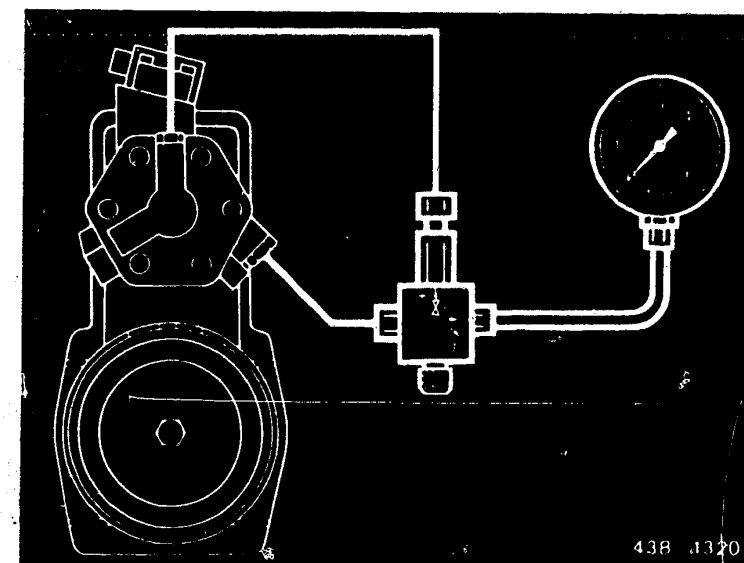
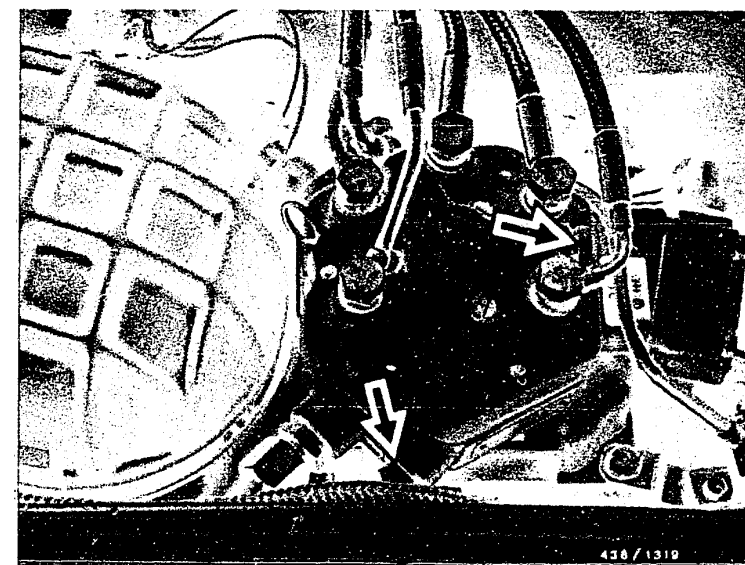
Make certain that the screw plug at the top (arrow at top) is always first to be opened in order to reduce the residual pressure in the system. Only then release the screw plug in the lower portion of the fuel distributor.

Connect connection "A" on the directional control valve to the measuring port on the fuel distributor using the double threaded fitting M 8 x 1/M 12 x 1.5 from KDJE-P 100/10.

Connect connection "B" to the connection for the cold-start valve on the fuel distributor using the hose from KDJE-P 100/11.

Checking the primary pressure:

Open the valve screw on the directional control valve (turning counter-clockwise).



D3

Pressure measurements/primary pressure
Audi 4000 four-wheel drive (USA)



D4

Pressure measurements/primary pressure
Audi 4000 four-wheel drive (USA)



Switch the electric fuel pump on by jumping the electrical safety circuit. To do so, connect the connection sockets 30 and 87 in the relay plate using an auxiliary lead.

The pressure gauge on the pressure tester indicates primary pressure.

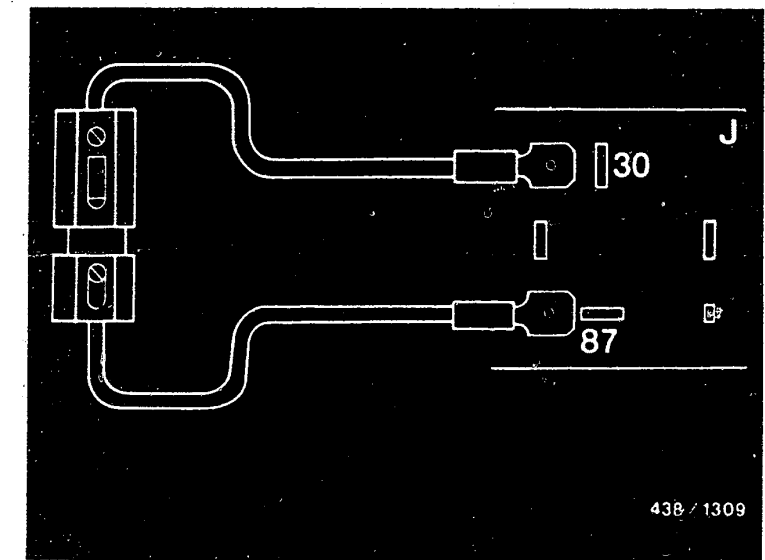
Test specification for primary pressure: 5.25 ... 5.6 bar gauge pressure

Possible causes for too low primary pressure:

- Fuel supply not OK. Fuel delivery from the electric fuel pump too low.
Measure fuel delivery at the return connection on the pressure regulator.
Test specification: min. 1300 cm³/min.
- Pressure regulator for primary pressure not OK.
Take out and replace the pressure regulator.

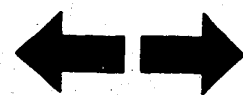
Possible causes for too high a primary pressure:

- Fuel return to the fuel tank has constriction.
To check, direct the return from the pressure regulator into a separate tank.
- Pressure regulator for primary pressure not OK.
Take out and replace the pressure regulator.



D5

Pressure measurements/primary pressure
Audi 4000 four-wheel drive (USA)



D6

Pressure measurements/primary pressure
Audi 4000 four-wheel drive (USA)



15.2 Checking differential pressure:

The basic operation of the KE-Jetronic and all electronically controlled correction functions are accomplished by means of differential pressure control. The differential pressure (the difference between the primary pressure and the pressure in the lower chambers of the differential pressure valves in the fuel distributor) is determined by the operation of the electro-hydraulic pressure actuator that is mounted on the fuel distributor.

The electrical and hydraulic function of the pressure actuator is evaluated by means of the following measurement of differential pressure. If this is functioning properly, the only possible cause for defects in the correction function must lie in the sector triggering the pressure actuator.

Because the differential pressure is measured as a function of the current triggering the pressure actuator, the universal test adapter is to be connected to a multimeter for this measurement.

Attachment of the pressure tester KDJE-P 100

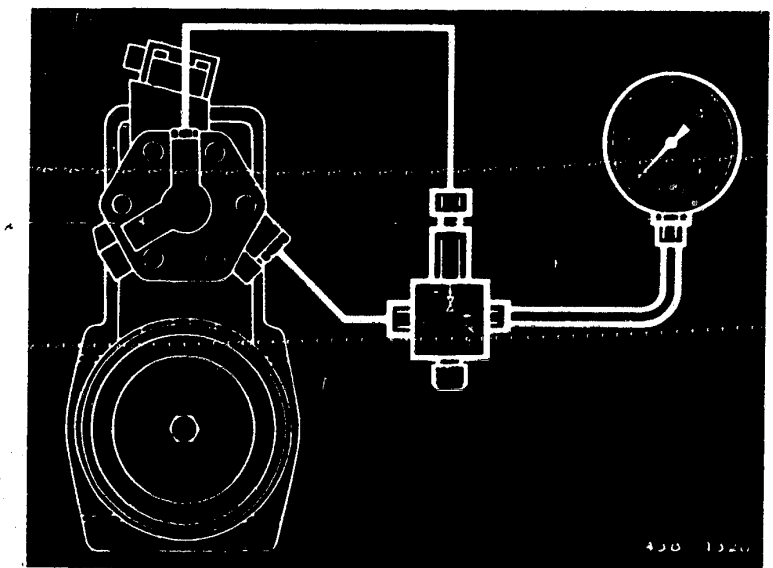
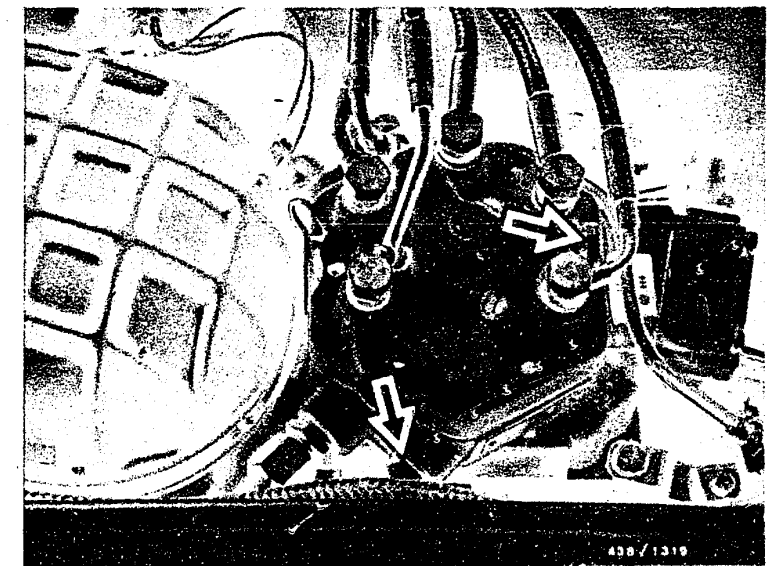
Attachment using the connecting part sets KDJE-P 100/10 .../11.

Important instructions:

There are two special measuring connections on the fuel distributor for connecting the pressure tester. These have been sealed with screw plugs. (Arrows, photo at top). Make certain that the screw plug at top (top arrow) is always the first to be opened in order to reduce the residual pressure in the system. Only then, release the screw plug in the lower portion of the fuel distributor.

Connect connection "A" of the directional-control valve to the measuring port in the fuel distributor using the double threaded fitting M 8 x 1/M 12 x 1.5 from KDJE-P 100/10.

Connect connection "B" to the connection for the cold-start valve on the fuel distributor using the hose from KDJE-P 100/11.



D7

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



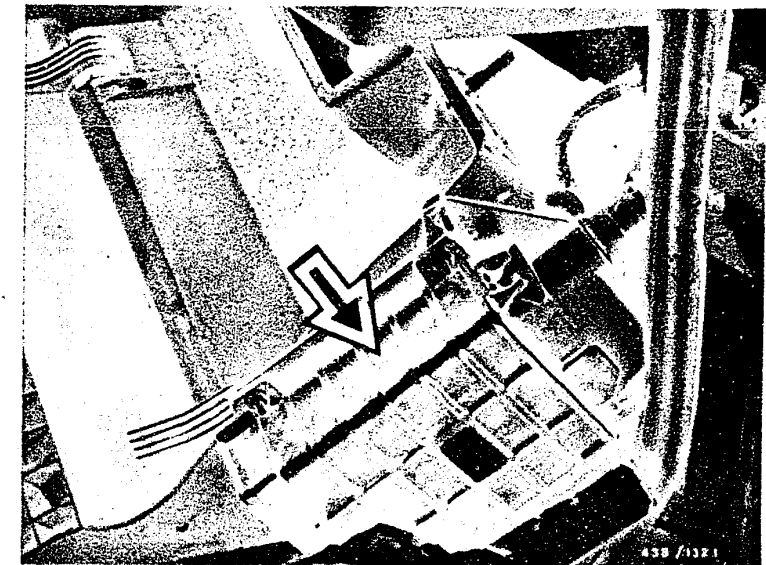
D8

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



Connecting the universal test adapter:

Connection is made directly at the KE control unit. The control unit (and the pressure sensor) is located in the passenger compartment, under the dashboard on the right, and is fastened to the outside of the glove compartment. The glove compartment is to be taken out to make the control unit accessible. The control unit can be pushed out of the mounting in the direction of the connecting plug.



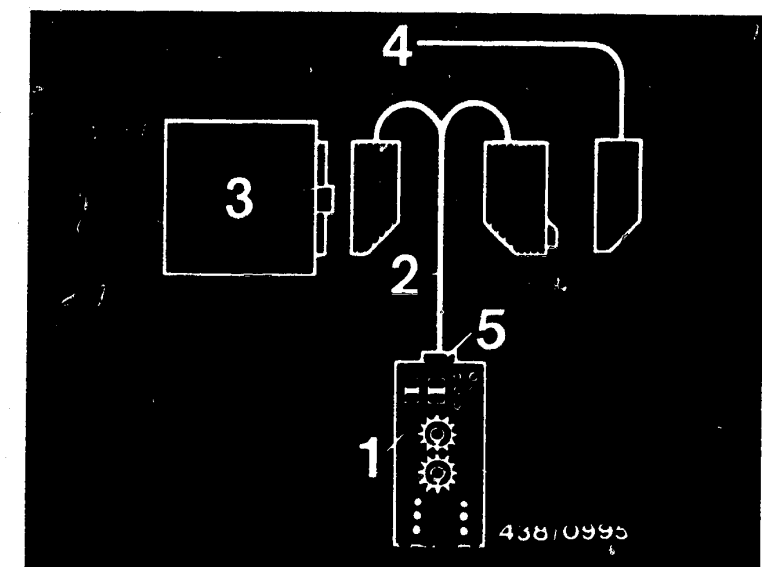
- 1 = Universal test adapter
- 2 = System adapter lead
- 3 = Control unit
- 4 = System wiring harness
- 5 = Pin terminal

Disconnect the multiple plug on the control. (Press the plug detent back and first flip the plug up on the side of the detent.) Connect the lead plug to the edge connector of the test lead for the universal test adapter.

Connect the multiple plug of the test lead to the control unit.

Connect the test lead to the universal test adapter via a pin terminal.

Connect an ammeter (e.g., Mislco Master 50 K multimeter) to the black connection sockets (A) of the universal test adapter in accordance with instructions from the manufacturer.



D9

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



D10

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



Test procedure

Switch the electric fuel pump on by jumping the electrical safety circuit. To do so, connect sockets 30 and 87 in the relay plate using an auxiliary lead.

Open the valve screw on the directional control valve of the pressure tester (turning counter-clockwise).

The pressure gauge now indicates primary pressure.

Test specification: 5.25 ... 5.6 bar gauge pressure

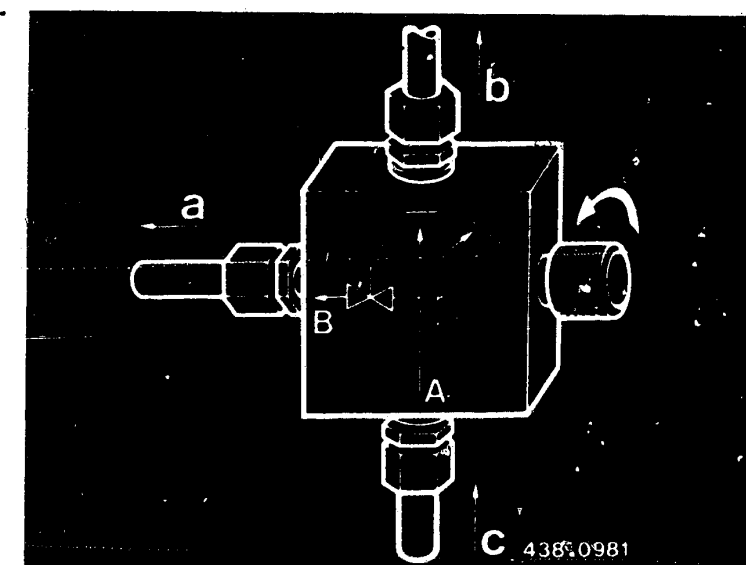
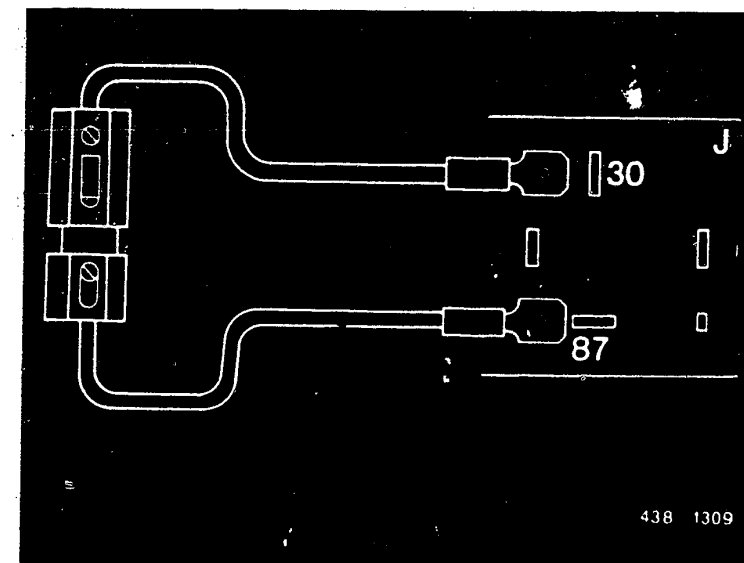
Note down the value as measured.

Possible causes of an incorrect result from measurement:

- Fuel supply system defective. Fuel delivery from the electric fuel pump too low.

Test specification: Minimum delivery 1300 cm³/min.

- Fuel return line to the fuel tank has constriction.
To check, unscrew the return line from the pressure regulator for primary pressure, and direct the return flow into a separate container.
- Pressure regulator for primary pressure not OK. Take out and replace the pressure regulator.



D11

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



D12

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



Measure the "warm" lower chamber pressure:

Take apart the connecting lead for the lambda sensor. The plug connection in the sensor lead in question is located in the area between the cylinder head and the engine bulkhead.

Jump the electrical safety circuit. To do so, jump the connecting sockets 30 and 87 in the relay plate using an auxiliary lead. Switch on ignition. Press button 2 on universal test adapter. The control unit is now operating on "open-loop control", and the actuator current is approx. 10 mA.

Close the valve screw on the directional control valve (turning clockwise).

The pressure indicated on the pressure gauge must now drop below the primary pressure as found above.

Determine the specified value for the "warm" lower chamber pressure from the diagram in accordance with the primary pressure as measured.

(Diagram: P_1 = primary pressure, P_2 = lower chamber pressure,
Actuator current = 0 A)

Possible reasons for incorrect result of measurement:

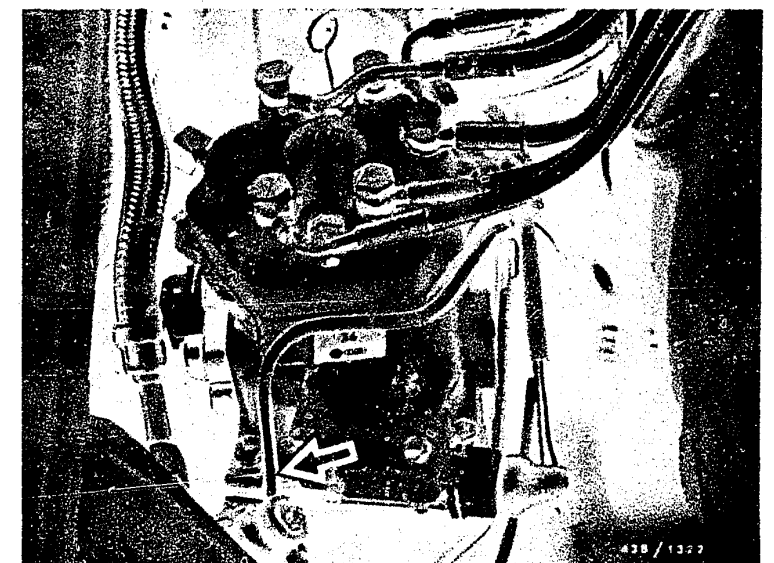
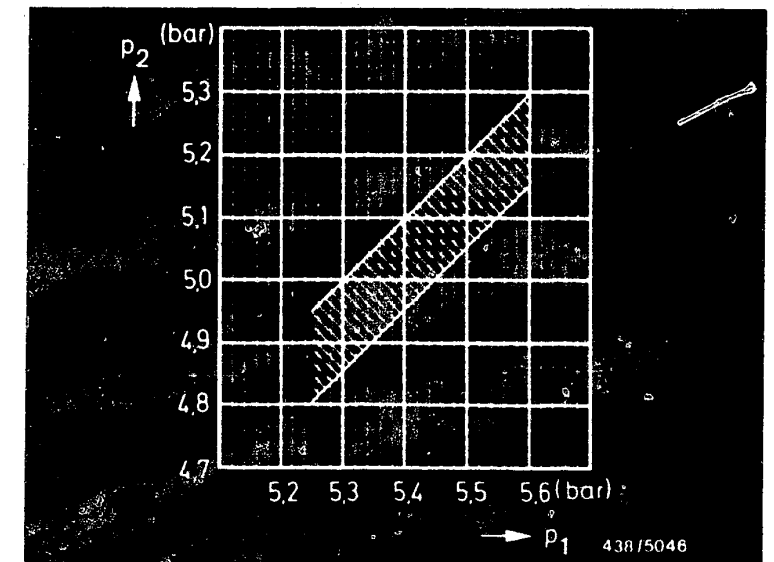
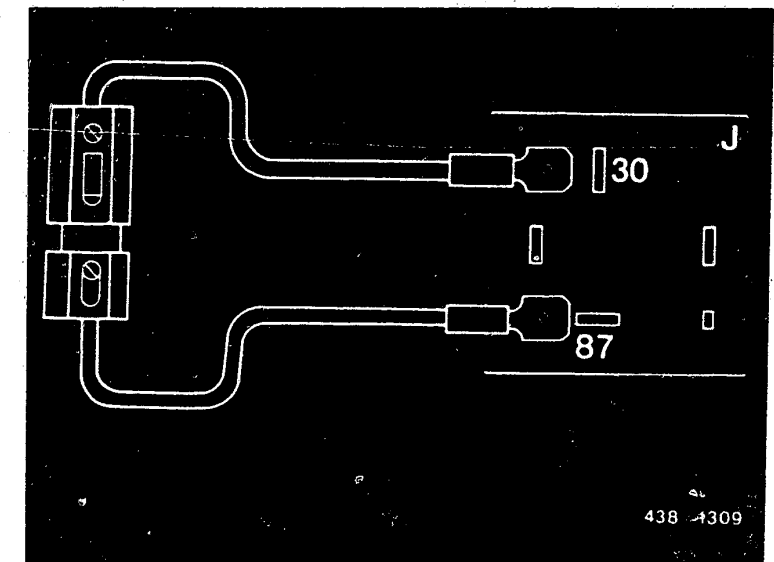
- Fuel decoupling throttle in the fuel distributor is clogged. To check, measure the overflow.
Unscrew the thin fuel line to the pressure regulator on the fuel distributor and plug it (Figure at bottom - arrow). Connect a hose with a ball connection M 10 x 1 to the free connection and measure the overflow.

Test specification: 130 ... 150 cm³/min.

If this value is not attained, take out and replace the fuel distributor.

- Electro-hydraulic pressure actuator is defective. Take out and replace the pressure actuator.

To do so, clean the fuel distributor in the area near the pressure actuator. The new pressure actuator is supplied only as a set of parts with new seal rings and fastening screws. In principle, put the pressure actuator on only using the new seal rings and the original fastening screws (non-magnetic steel).



D13

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



D14

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



Measuring the "cold" lower chamber pressure:

The lead plug on the lambda sensor remains apart.

Disconnect the lead plug on the temperature sensor (NTC) (arrow).

The valve screw on the directional control valve remains closed (turning clockwise).

Switch the ammeter to the scale 0 ... 100 mA.

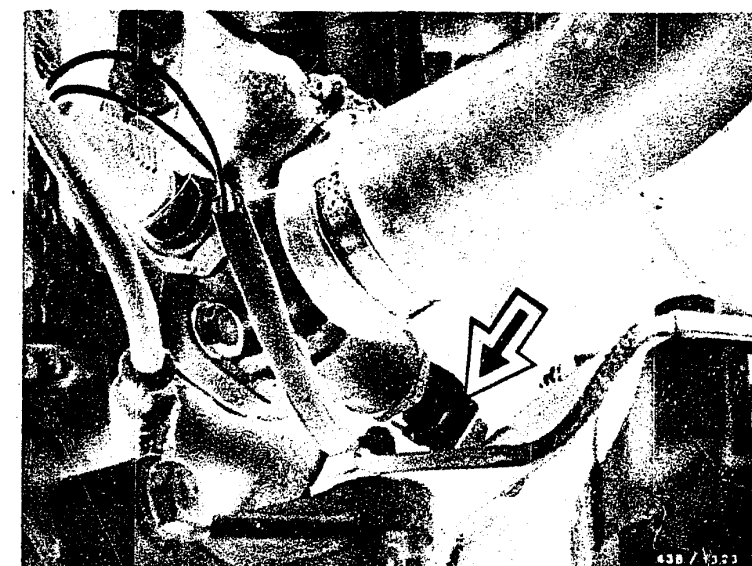
Switch the ignition on.

Determine the specified value required for lower chamber pressure from the diagram in accordance with the actuator current now shown on the ammeter and the primary pressure as measured above.

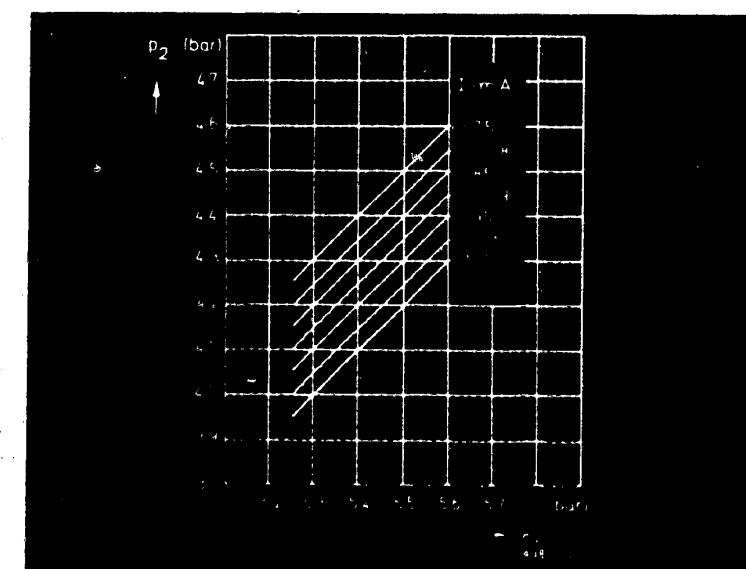
Bear in mind the tolerance of ± 0.15 bar to be applied to each characteristic curve!

If the reading exceeds or falls below the required specified value for lower chamber pressure, the cause lies with the electro-hydraulic pressure actuator. Take out and replace the pressure actuator.

To do so, clean the fuel distributor in the area near the pressure actuator. The new pressure actuator is supplied only as a set of parts with seal rings and fastening screws. In principle, put the pressure actuator on only using new seal rings and the original fastening screws (non-magnetic steel).



P_1 = Primary pressure
 P_2 = "Cold" lower chamber pressure
Tolerance ± 0.15 bar
 I = Actuator current (mA)



D 15

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



D 16

Pressure measurements/diff. pressure
Audi 4000 four-wheel drive (USA)



15.3 Checking the fuel system as a whole for internal leaks:

Attachment of pressure tester KDJE-P 100:

Attach using connecting part sets KDJE-P 100/10 .../11.

Important instructions:

There are two special measuring connections on the fuel distributor to connect the pressure tester. These are sealed with screw plugs (arrows).

Make certain that the screw plug at the top (top arrow) is always the first to be opened to reduce the residual pressure in the system. Only then, release the screw plug in the lower part of the fuel distributor.

Connect connection "A" on the directional control valve to the measuring port in the fuel distributor using the threaded double fitting M 8 x 1/M 12 x 1.5 from KDJE-P 100/10.

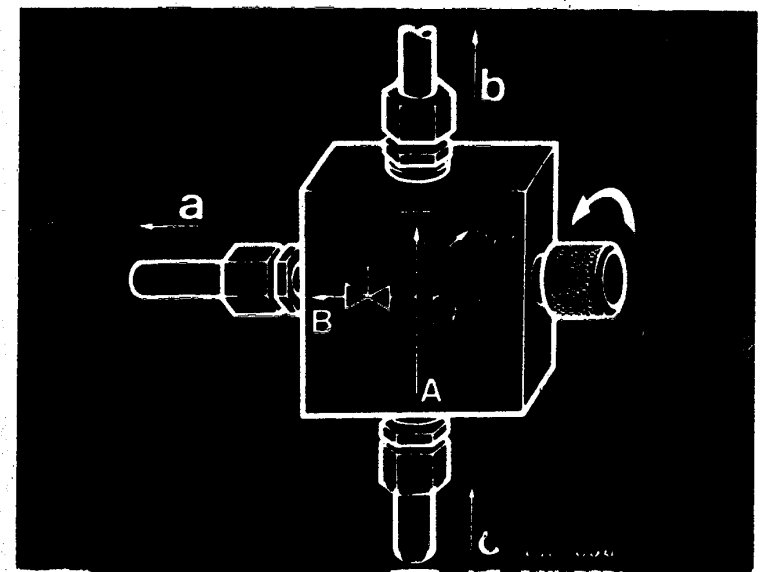
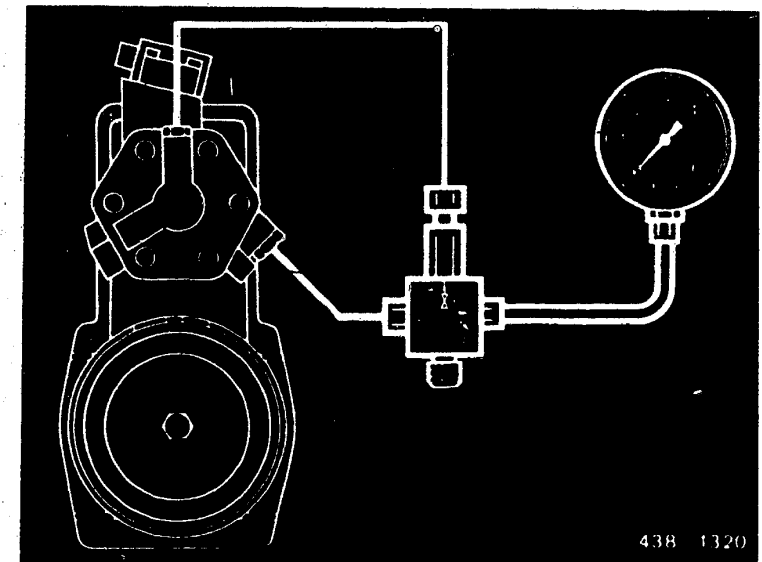
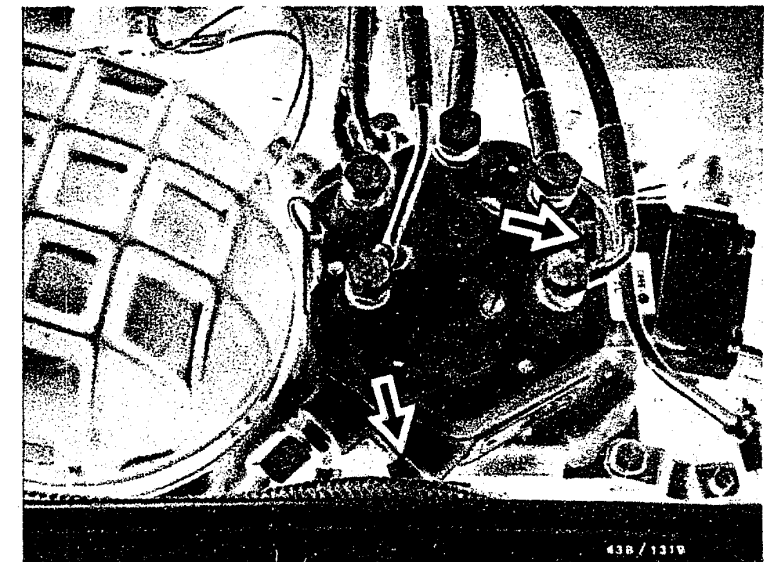
Connect connection "B" to the connection for the cold-start valve on the fuel distributor using the hose from KDJE-P 100/11.

Test procedure:

Test with the engine at standstill.

Test with engine at normal operating temperature, but not after the engine has just been driven very hot.

Open the valve screw on the directional control valve of the pressure tester (turning counter-clockwise).



D17

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)



D18

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)



Switch the electric fuel pump on by jumping the electrical safety circuit (jump connection sockets 30 and 87 in the relay plate using an auxiliary lead), until primary pressure has been built up. Then switch it back off. Watch the drop in pressure on the pressure gauge.

Test specifications for the leak test:

Min. pressure after 10 minutes: 2.7 bar gauge pressure

Min. pressure after 20 minutes: 2.6 bar gauge pressure

Possible causes for leaks (too rapid a pressure drop):

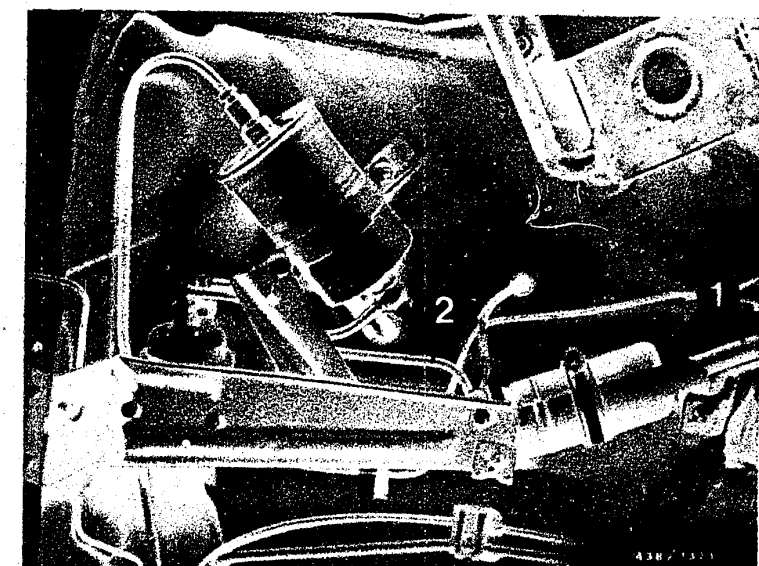
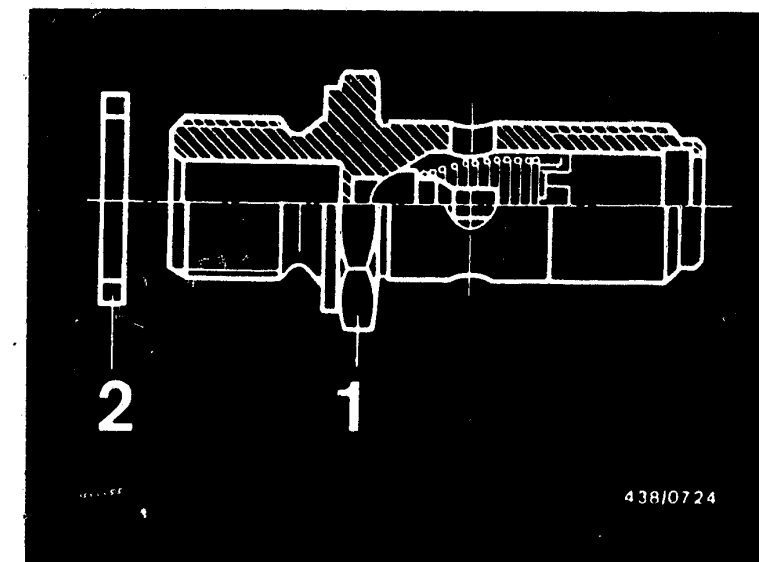
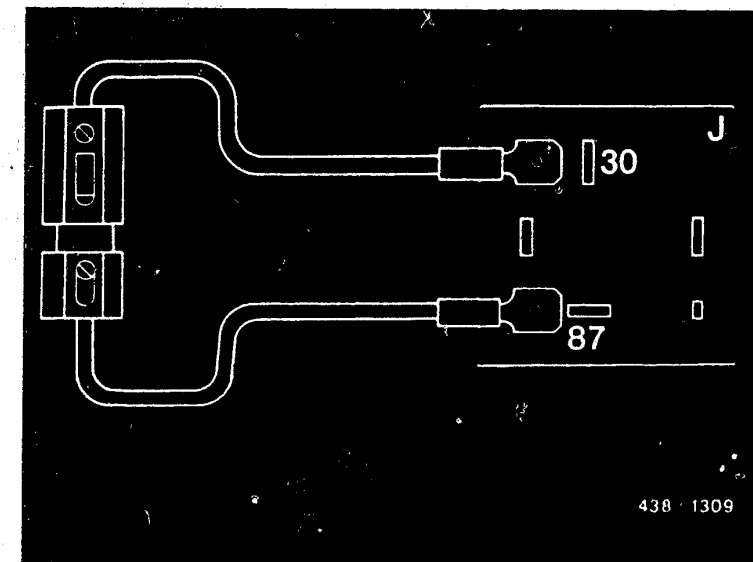
- Non-return valve on the delivery end tube fitting for the electric fuel pump leaks.

To test, crimp off the suction line of the electric fuel pump (e.g., with crimper W 157 from Matra) and repeat the test for leaks. If the leak has now been eliminated, take out and replace the tube fitting. The new male tube fitting (1) is supplied together with the seal ring (2) that goes with it as a set of parts under part number 1 587 010 006.

Taking out and replacing the male tube fitting:

Crimp the suction hose for the electric fuel pump (1) off again.

Unscrew the cap nut on the delivery pipe, holding the fixed hex with a wrench. Remove the delivery line (2) and the seal rings. Catch any residual fuel that flows out. Unscrew the male tube fitting with the non-return valve built into it and screw on a new delivery fitting to a tightening torque of 10 ... 16 Nm. Connect up the delivery line again using new seal rings and cap nut.



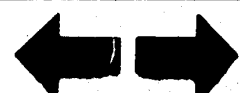
D19

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)



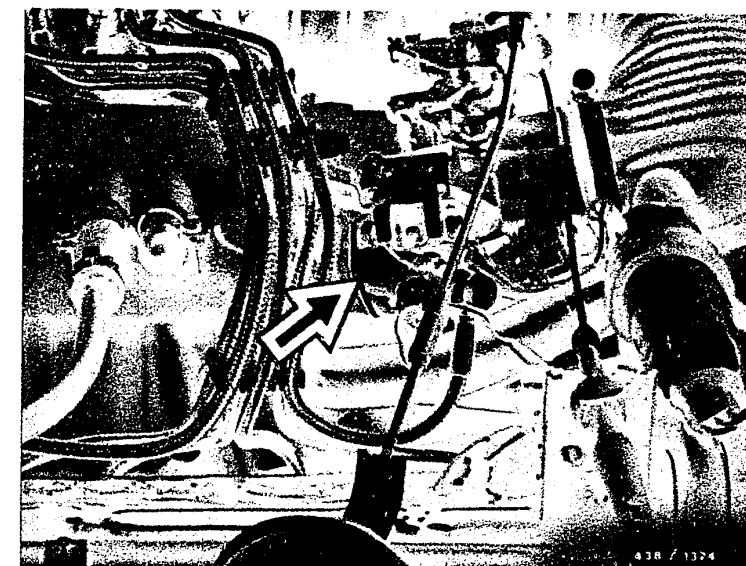
D20

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)

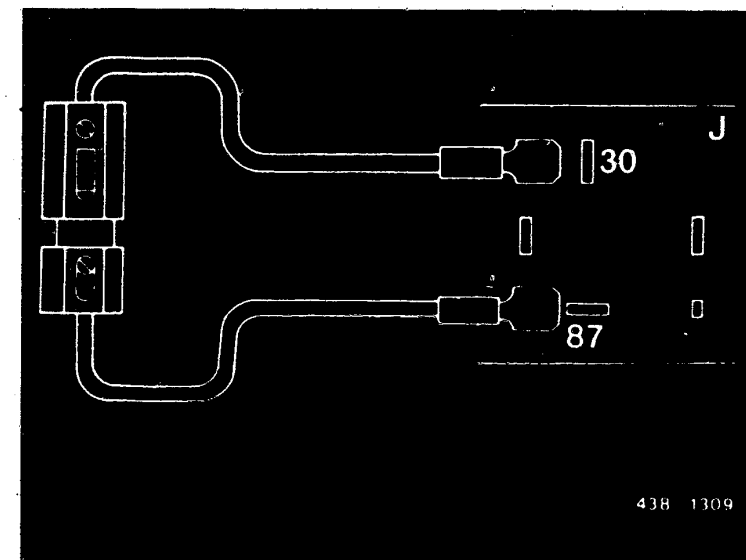


- Cold-start valve leaks.

Take the cold-start valve (arrow) out for testing. The fuel line remains connected.

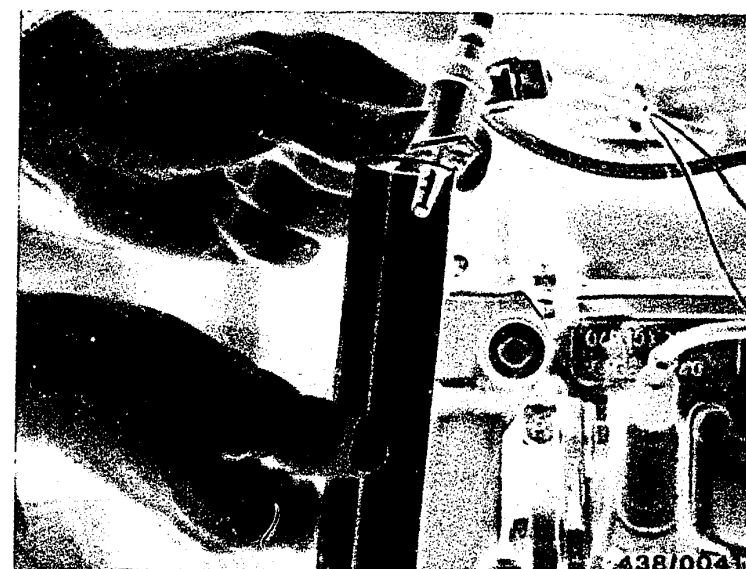


Switch on electric fuel pump by jumpering the electrical safety circuit. To do so, jumper sockets 30 and 87 in relay plate with auxiliary lead.



It is now not permissible for any dripping to occur at the nozzle of the cold-start valve within one minute. The cold-start valve must not leak even when shaken or pounded.

If it has been necessary to take out and replace the cold-start valve due to leaks, recheck the idle adjustment and if need be correct it. Idle adjustment is described at Coordinates G 21.



D21

Pressure measurements/test for leaks

Audi 4000 four-wheel drive (USA)



D22

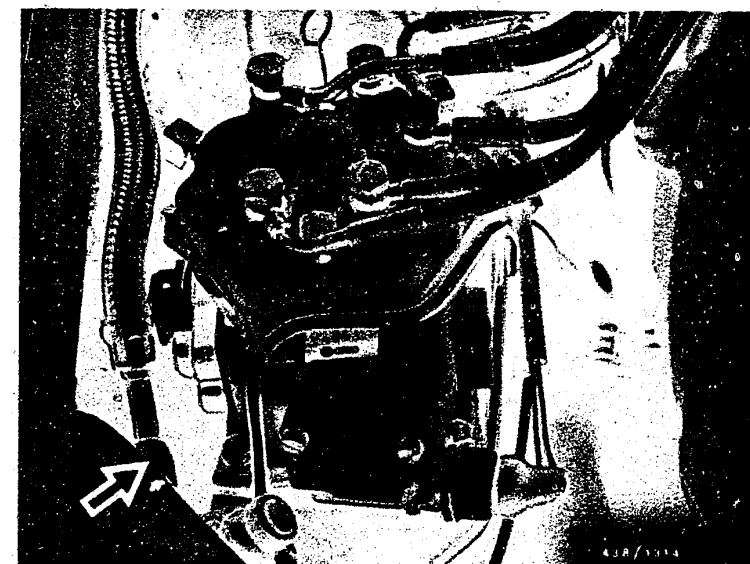
Pressure measurements/test for leaks

Audi 4000 four-wheel drive (USA)



- The diaphragm-type pressure regulator for primary pressure is leaking.

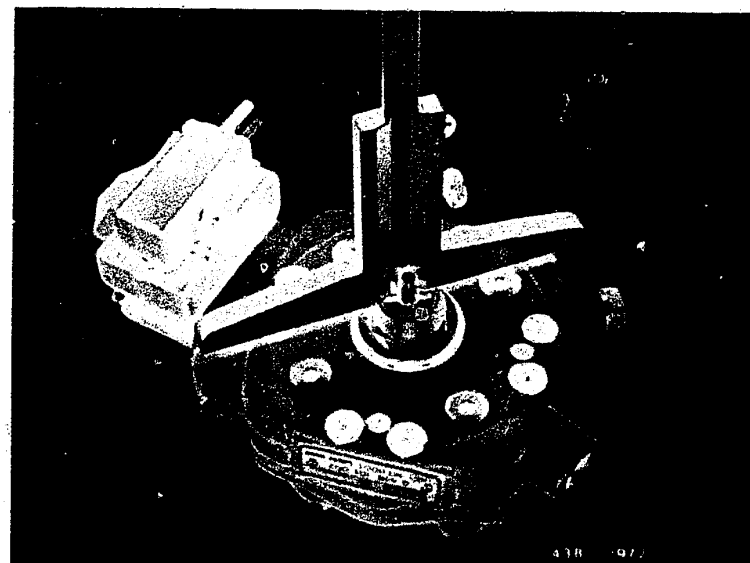
To test, unscrew the return line on the diaphragm-type pressure regulator and seal the connection tightly (e.g., using a union nut M 14 x 1.5 and ball). If the leak has now been eliminated, take out and replace the diaphragm-type pressure regulator.



- The seal ring for the lower plunger seal in the fuel distributor is leaking.

Clean the fuel distributor, unscrew all fuel connections from the fuel distributor, and remove the fuel distributor from the air-flow sensor.

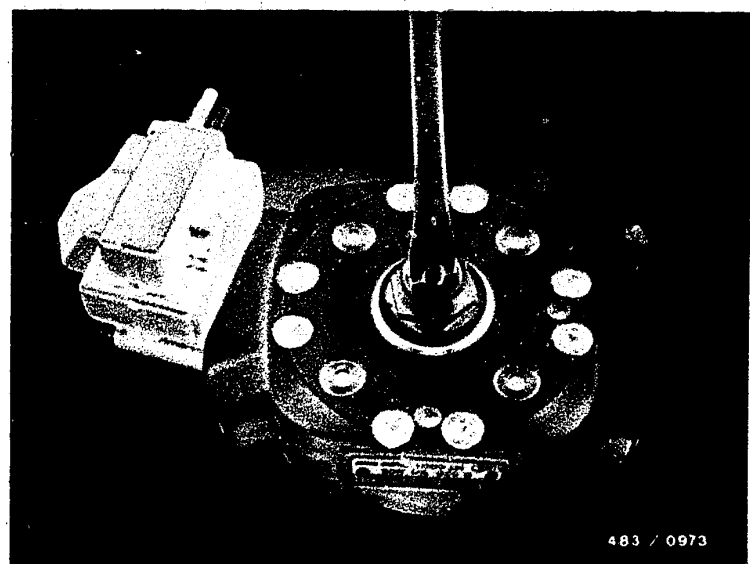
Measure the position of the slotted round nut for the plunger seal with respect to the fastening nut for the barrel with metering slits using a depth gauge, and note it down for later reinstallation. In addition, mark the rotational position of the slotted round nut.



Using a shoulder screwdriver, unscrew the slotted round nut.

Carefully take out and replace the molded seal ring on the slotted round nut. Do not damage it). Screw the slotted round nut back in to the position found on removal, and turn it as far as the marking.

Put the fuel distributor back on the air-flow sensor. In so doing, insert a new seal ring between the air-flow sensor and the fuel distributor. Maintain exactly the tightening torque for the fuel distributor fastening screws of 3.2 ... 3.8 Nm.



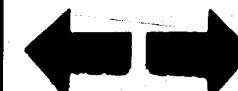
D23

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)



D24

Pressure measurements/test for leaks
Audi 4000 four-wheel drive (USA)



Checking the setting of the lower plunger seal (slotted round nut):

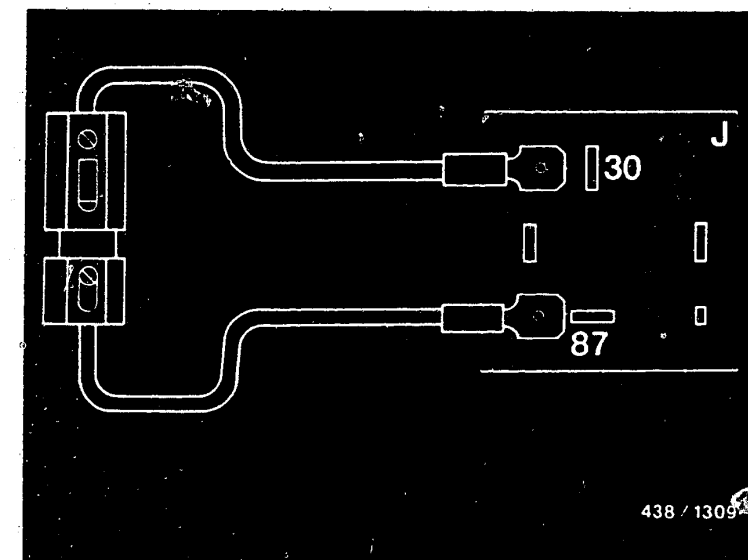
Switch the electric fuel pump on for a few seconds by jumping the electrical safety circuit so that the control plunger is subjected to pressure. To do this, connect connection sockets 30 and 87 in the relay plate with an auxiliary lead.

If the position of the air-flow sensor plate has been correctly set, it is now not permissible for the control plunger to lie up against the needle bearing in the air-flow sensor plate intermediate lever. To check this, raise the air-flow sensor plate slightly. The air-flow sensor plate lever must have a free travel between its zero position and the point of contact with the control plunger. This free travel is to be approx. 2 mm at the center of the air-flow sensor plate.

If this specification is not met, the fuel distributor must be taken back off and the position of the slotted round nut must be corrected accordingly.

If the free travel is too small, screw the slotted round nut further in, and vice versa.

Changing the position of the plunger or the slotted round nut by 0.1 mm corresponds to approx. 0.7 mm at the center of the air-flow sensor plate.



E1

Pressure measurements/test for leaks

Audi 4000 four-wheel drive (USA)



E2

Pressure measurements/test for leaks

Audi 4000 four-wheel drive (USA)



16. Checking the fuel-injection valves

The fuel-injection valves must be taken out for testing. Pull the valves out of their receptacles and unscrew the fuel-injection lines. In so doing, hold the fixed hex of the valve with a wrench. Do not crimp the fuel-injection lines.

When reinstalling the fuel-injection valves, use in principle new seal rings (O-rings on the valve stem). Part number: 3 430 210 600.

Note on the part number for the fuel-injection valve:

The fuel-injection valves installed in the Audi 4000 four-wheel drive vehicle have the part number 0 437 502 026 (original equipment) or .. 027 (sales designation). These valves have a firmly pressed-on air guide cap (for the air shrouding system). For replacements, order valves with the sales designation .. 027 above and not in accordance with the designation .. 023 as stamped in on the valve stem.

16.1 Test equipment and testing medium

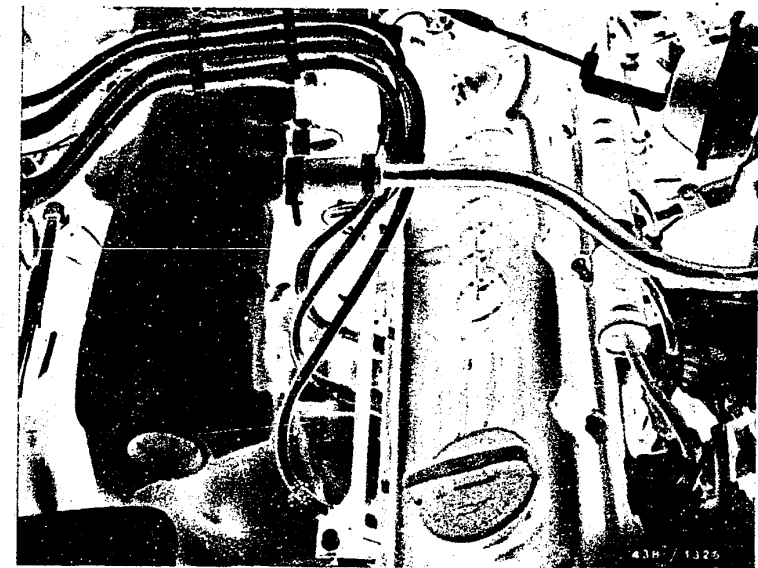
The testing specification below is for valve tester KDJE-P 400 (formerly KDEP 7452) and 0 681 200 700.

Follow the specifications for testing medium!

Testing medium: Testing gasoline
Bosch part designation VS 14 942 - CH, formerly
Part number 5 973 340 650.
The testing gasoline can be obtained in 5-liter drums from
the following vendor:
Oskar Gnam GmbH & Co
D-7531 Kämpfelbach-Bilfingen

Caution:

Due to considerations of safety, it is never permissible to use driving gasoline or similarly highly flammable and combustible fluids. Even when using testing gasoline, be absolutely certain to follow the local governmental regulations.



E3

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



E4

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



16.2 Connecting fuel-injection valves to the tester

Connect the fuel-injection valve to the valve tester and bleed the delivery line by activating the lever several times with the union nut open. Then tighten the union nut.

16.3 Checking for fouling

Activate the manual lever slowly (approx. 2 s/stroke) with the pressure gauge shutoff cock open. If the pressure does not build up to 1 ... 1.5 bar, the fuel-injection valve is leaking severely (e.g., due to particles of dirt jammed in). An attempt can be made to flush the fuel-injection valve clean by activating the lever several times strongly.

If this succeeds, continue the test. If flushing it clean is not possible, scrap the fuel-injection valve.

16.4 Checking opening pressure

Fuel-injection valve	Test specification, opening pressure
0 437 502 026/027	3.0 ... 4.1 bar gauge pressure

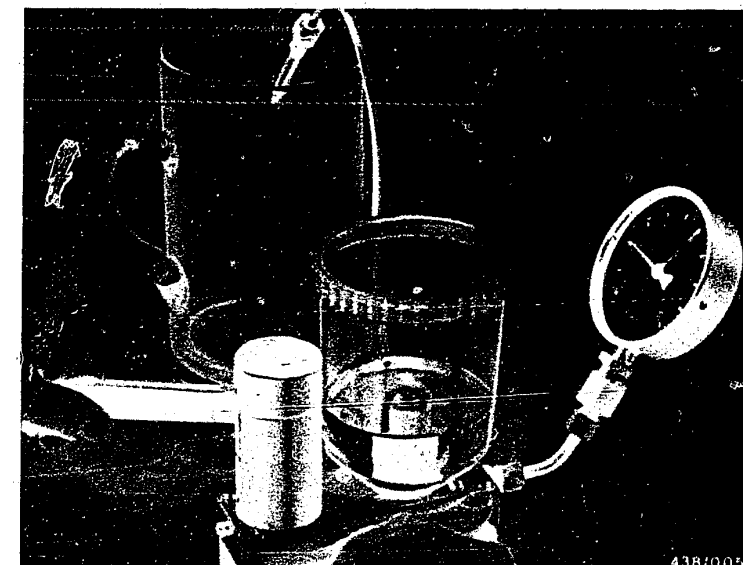
With the shutoff cock closed, flush the valve and bleed it by activating the lever several times.

Open the shutoff cock and check the opening pressure by moving the lever slowly (approx. 2 s/stroke).

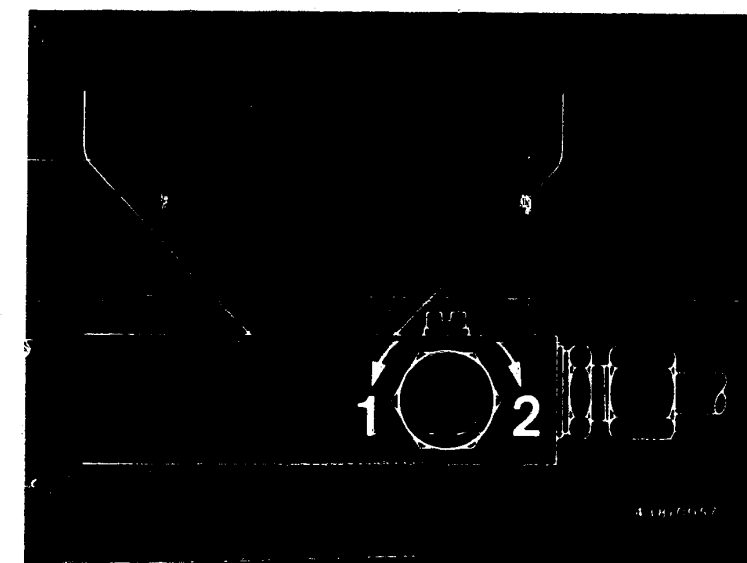
If the opening pressure is not within tolerance, take out and replace the fuel-injection valve. It is also possible to take out and replace individual fuel-injection valves within a single set.

16.5 Checking for leaks

Open the shutoff cock and slowly increase the pressure up to 0.5 bar less than the opening pressure as determined above. Hold the pressure there. It is now not permissible for any dripping to occur on the valve within 15 s.



1 = Open 2 = Shut



E5

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



E6

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



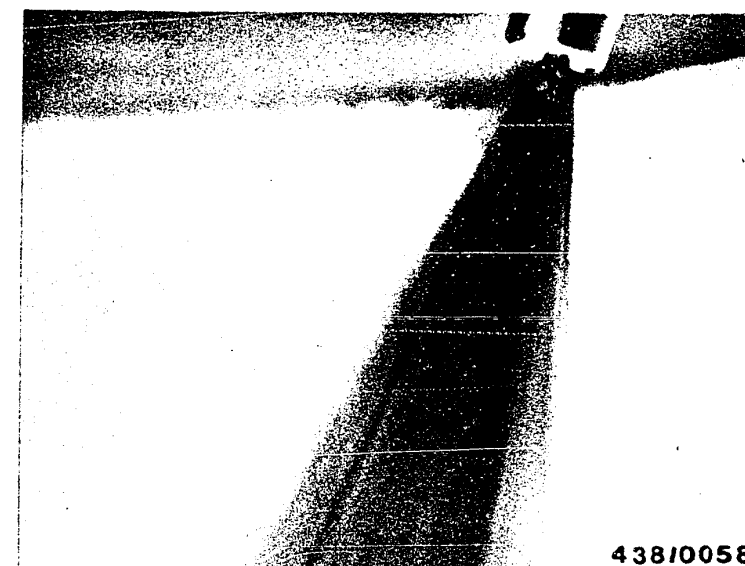
16.6 Chatter test evaluation of spray

The valve must chatter with a lever speed of approx. 1 stroke/second. It is not permissible for any drop to form at the opening of the valve. There must not be any chord spray coming out. A one-sided atomized spray within an overall spray angle of approx. 35° is allowable (see examples in Figures).

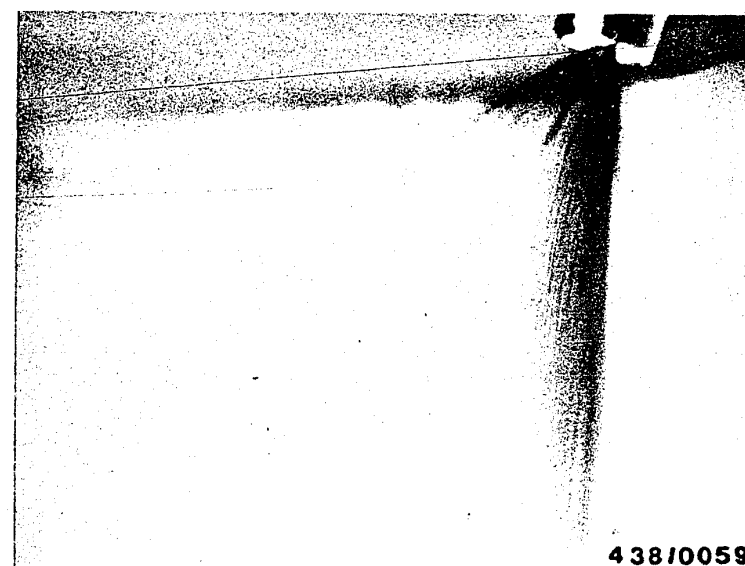
Figure shows good spray formation.

Figure shows a one-sided spray formation that is still good.

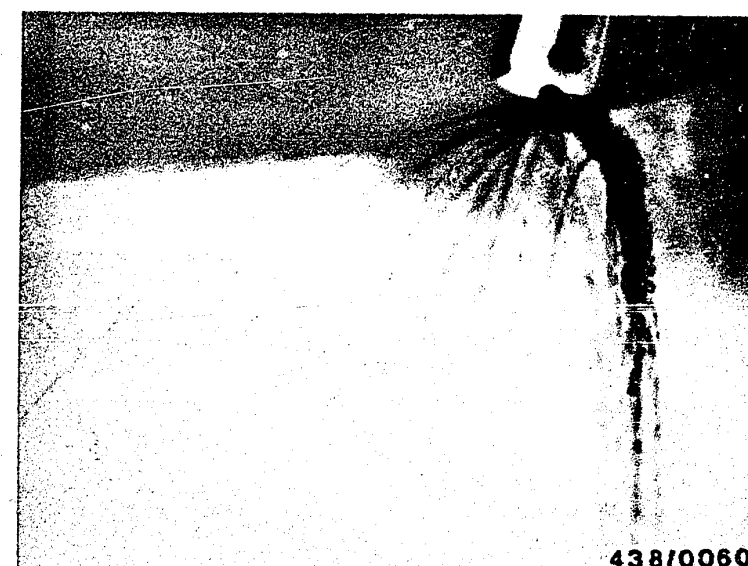
Poor spray formation. Scrap the fuel-injection valves. The figure shows drop formation.



438/0058



438/0059



438/0060

E7

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)

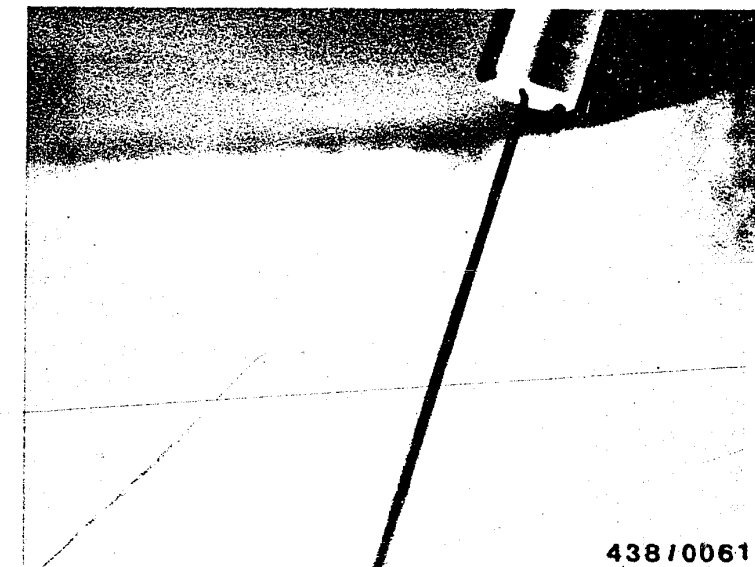


E8

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)

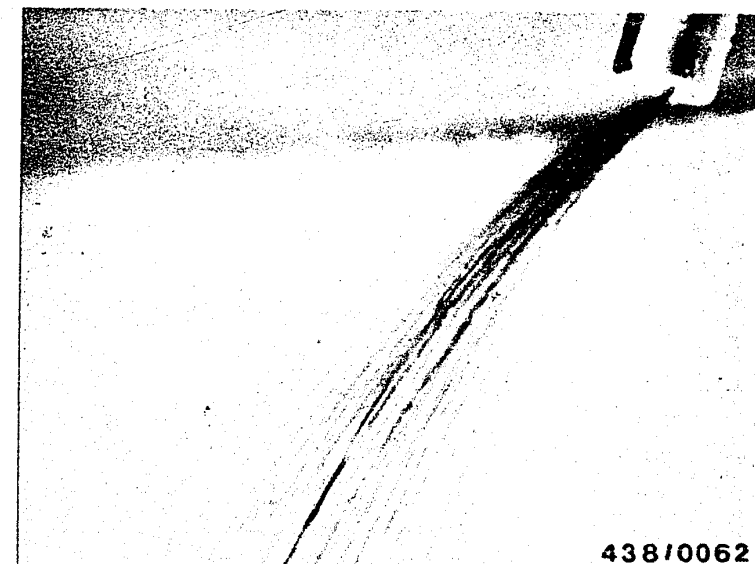


Poor spray preparation; scrap the fuel-injection valves.
The figure shows chord spray.



438/0061

Poor spray preparation; scrap the fuel-injection valves.
The figure shows spray in strands.



438/0062

Note on the fuel-injection valve part number:

The fuel-injection valves installed in the Audi 4000 four-wheel vehicle have the part number 0 437 502 026 (original equipment) or .. 027 (sales designation). These valves have a firmly molded-on air guide cap (for the air shrouding system). For replacements, order valves with the sales designation .. 027 above, and not according to the designation .. 023 as stamped in on the valve stem.

Whenever damaged fuel-injection valves have been taken out and replaced, the idle is to be adjusted afterwards with the engine at normal operating temperature.

Idle adjustment has been described at Coordinates G 21.

E9

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



E10

Checking fuel-injection valves
Audi 4000 four-wheel drive (USA)



17. Comparative measurement of fuel deliveries from fuel distributor outlets:

Measurement using the tester for comparison of fuel deliveries KDJE-P 200 (formerly KDJE 7451).

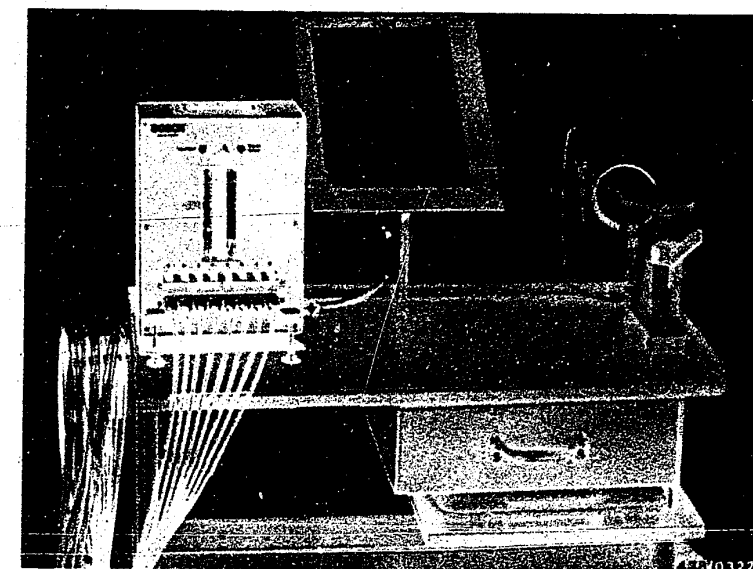
17.1 Use

The difference in fuel deliveries from the individual outlets of the fuel distributor, one from the other, is checked by means of a comparative measurement. The instrument is designed in such a way that the testing can be done on the vehicle without taking the fuel distributor out.

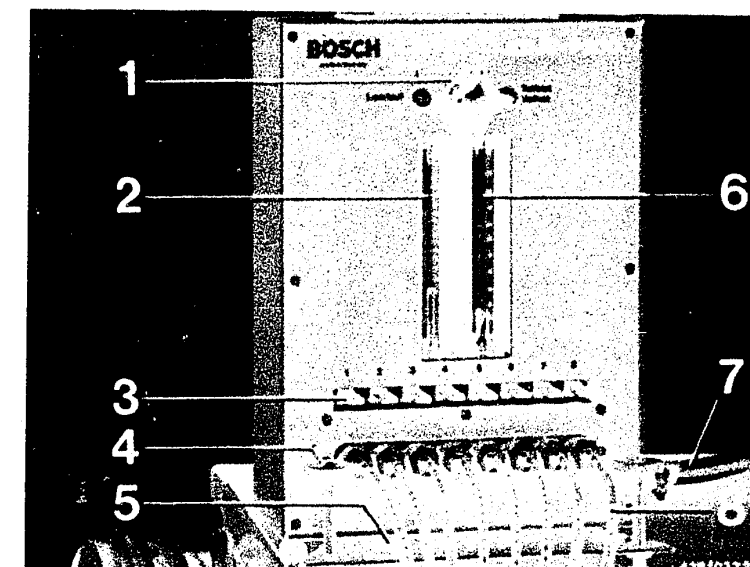
Because the testing is done using the original fuel-injection valves, it is possible to identify at the same time whether any variation originates in the fuel distributor or in the fuel-injection valves.

17.2 Structure

The tester is designed for all engines up to and including 8-cylinder designs.



- 1 = 3-way switch-over valve
- 2 = Small rotameter tube
- 3 = Buttons for 8-way valve
- 4 = Adjusting screw for set-up
- 5 = Water level
- 6 = Large rotameter tube
- 7 = Fuel return line
- 8 = Polyamide hoses (test lines)



E11

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



E12

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



A sheet steel housing contains 2 rotameter tubes, measuring scales 2 ... 15 cm³/min. and 10 ... 180 cm³/min., one 8-way valve for pushbutton operation (3) and a 3-way cock (1).

The small rotameter tube (2) is used for measurement at idle, the large rotameter tube (6) for measurement of the delivery at part load and full load. The rotameter tube required in each instance is switched on using the 3-way cock. The fuel deliveries from each cylinder are checked one after the other using the 8-way valve.

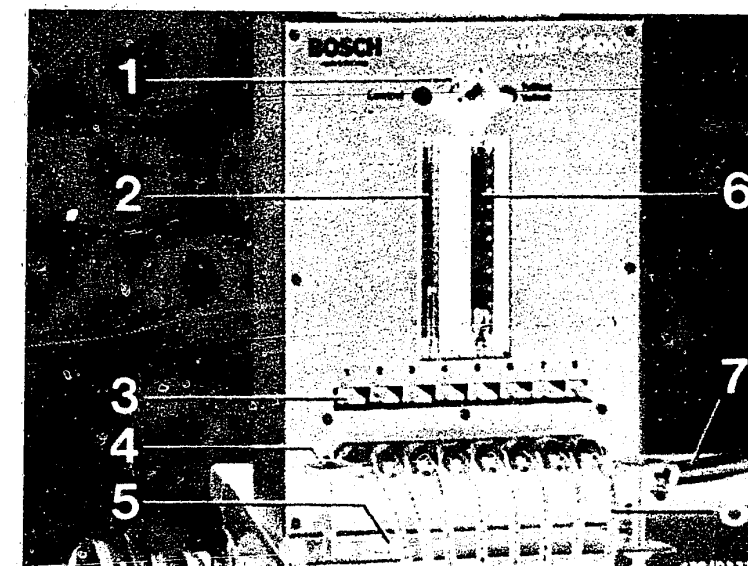
There are 8 hoses (8) on the instrument, into the automatic couplings of which the fuel-injection valves are inserted after removal from their receptacles on the engine. Each automatic coupling contains a push valve so that no fuel can escape at lines that are not required (for 4 or 6 cylinder systems).

The fuel is returned to the fuel tank via a hose (7) approx. 5 m long.

The entire test is run with the circuit closed, i.e., no fuel can escape to the outside.

17.3 Setting up and connecting the tester for comparative measurement of fuel deliveries

Set the tester up securely next to the vehicle (e.g., on tester trolley KDJE-W 100), and adjust using the built-on water level (level on the baseplate of the instrument).



E13

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



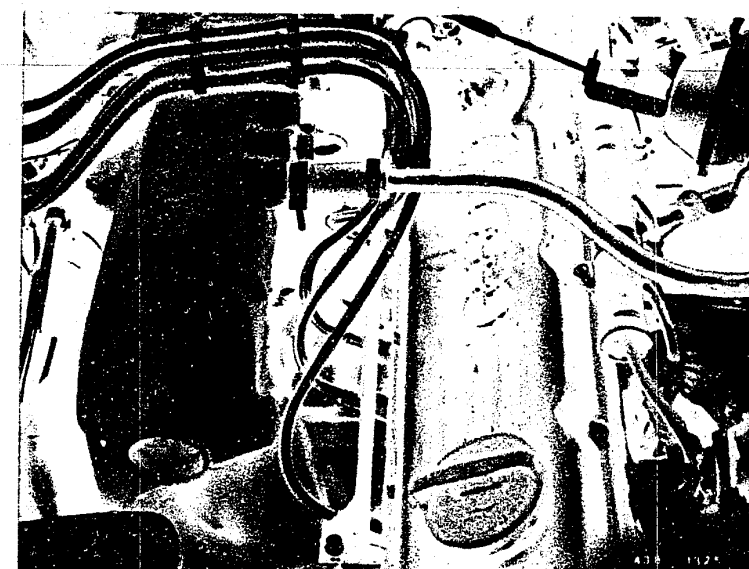
E14

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



To test, take the fuel-injection valves out. The fuel-injection lines remain connected. Do not crimp the fuel-injection lines.

When reinstalling the fuel-injection valves, in principle use new seal rings (O-rings on the valve stem). Part number: 3 430 210 600



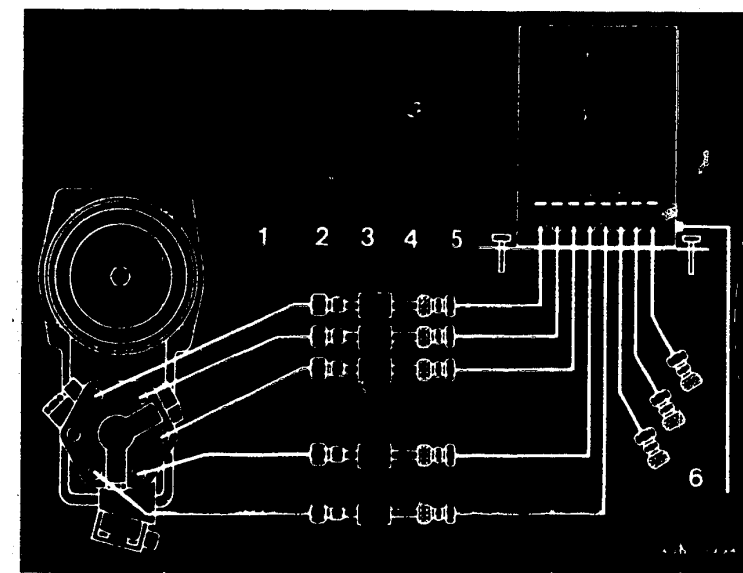
- 1 = Fuel-injection lines of the fuel distributor
- 2 = Fuel-injection valves
- 3 = Adapter sleeves
- 4 = Automatic couplings
- 5 = Tester lines
- 6 = Return lines to the fuel tank filling pipe

Clean the fuel-injection valves with rags, and using the adapter sleeves KDJE-P 200/19, insert them into the automatic couplings on the tester lines.

Note:

Insert the adapter sleeves firmly as far as the stop in the automatic couplings so that the non-return valves are opened all the way. Tighten the knurled nuts on the automatic couplings firmly.

Insert the return hose from the tester into the filling tube on the fuel tank.



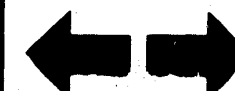
E15

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



E16

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)

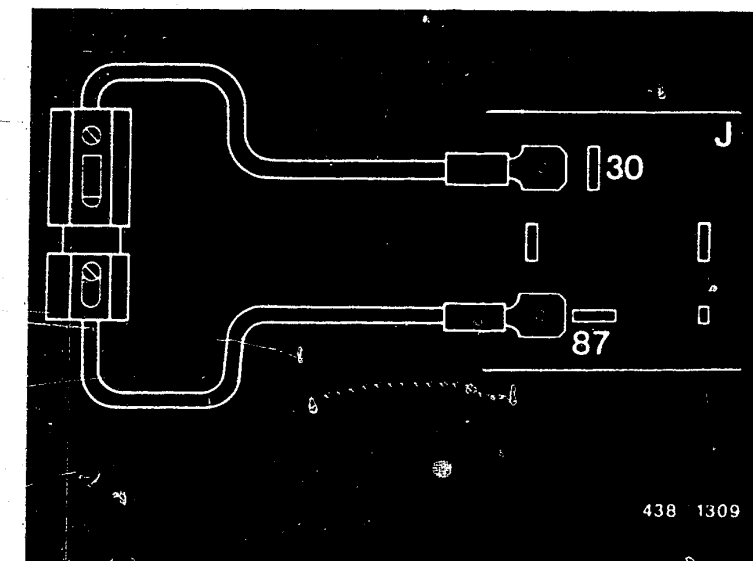


17.4 Bleeding the tester for comparative measurement of fuel deliveries:

Switch the electric fuel pump on by jumping the electrical safety circuit. To so do, jump connection sockets 30 and 87 in the relay plate using an auxiliary lead.

Raise the sensor plate in the air-flow sensor up to the stop. Press the buttons on the 8-way valve one after the other, while switching over the 3-way cock several times, until both rotameter tubes have been bled.

Return the air-flow sensor plate to its at rest position.



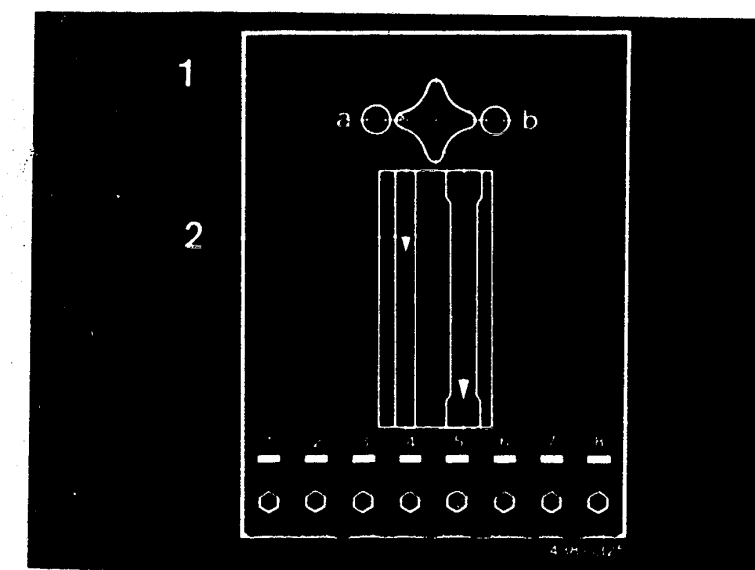
- 1 = White dot
- 2 = Measuring line
- a = Idle
- b = Part load/full load

17.5 Testing:

Comparative measurement of fuel deliveries takes place at idle, part load, and full load.

Measurement at idle using the small rotameter tube (white dot at the left on the knob), measurement at part load and full load with the large rotameter tube (white dot at the right).

The reading of fuel deliveries on the rotameter tubes is taken at the upper edge of the tapered float (Item 2). On testers with a ball float, the top point on the ball is used. For every measurement, be certain to wait until the float has reached its end position. If the flows are small, that can take 20 ... 30 seconds.



E17

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)

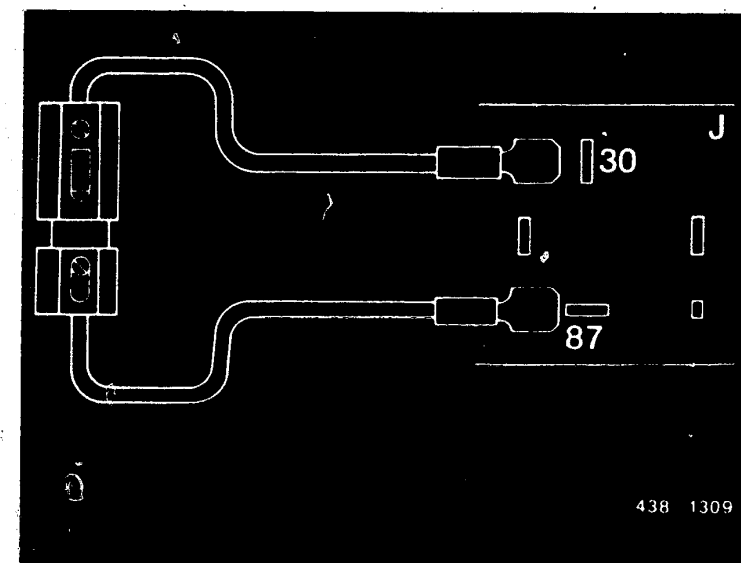
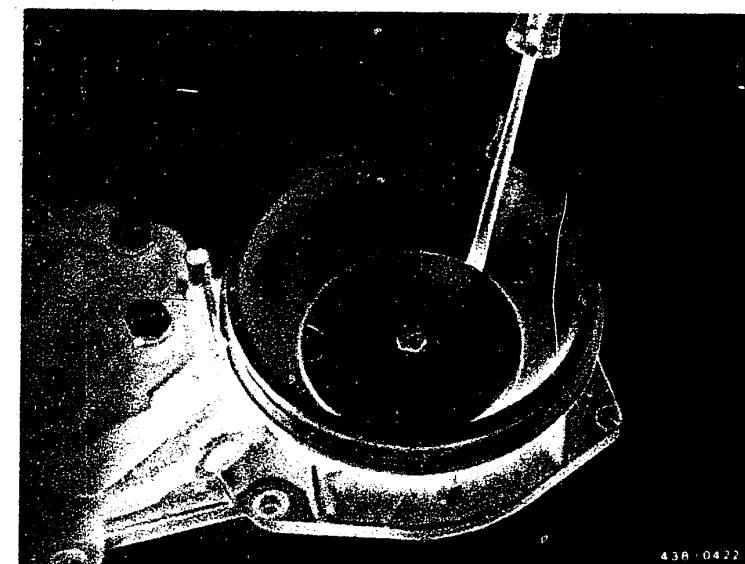


E18

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



The exact setting and fixing of the position for the air-flow sensor plate for the various load ranges are made using a screwdriver (a small one for the idle position). This is jammed in to an appropriate depth between the air funnel and the air-flow sensor plate.



Test procedure:

Switch the electric fuel pump on by jumping the electrical safety circuit. To do this, connect connection sockets 30 and 87 in the relay plate using an auxiliary lead.

Disconnect (separate) the lead plug for the lambda sensor lead.

Fixed numerical values have been indicated in the section below as max. allowable differences in fuel deliveries for the individual load ranges.

The value for "setting point" is always for the fuel distributor outlet with the minimum fuel delivery. That means, the outlet with the minimum fuel delivery must always be determined first.

E19

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



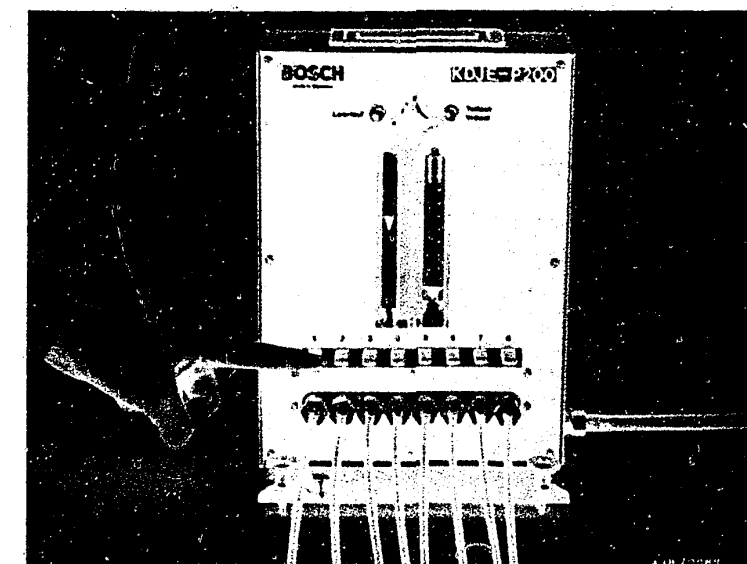
E20

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



Test specifications:

Load range	Setting point	Max. allowable fuel delivery
Idle:	6.0 cm ³ /min	6.6 cm ³ /min
Part load:.	40.0 cm ³ /min	42.5 cm ³ /min
Full load:	100.0 cm ³ /min	109.0 cm ³ /min
Full load with max. deflection of air-flow sensor plate. Minimum fuel delivery from all outlets:	140.0 cm ³ /min	-----



Press the button for outlet 1. Deflect the air-flow sensor plate until the appropriate rotameter tube shows approximately the value "setting point".

Check the remaining outlets in order to find the outlet with the minimum fuel delivery.

Press the button for this outlet again, and by correcting the position of the air-flow sensor plate, adjust the fuel delivery exactly to the "setting point", and fix the air-flow sensor plate in place again.

Press the remaining buttons one after the other, and measure the maximum fuel delivery from each outlet. The only deviations in fuel delivery possible are above the "setting point".

If too great a deviation is found in the test in one of the three load ranges, repeat the test for verification.

If the result is confirmed, check whether the reason lies with the fuel distributor or with the fuel-injection valves.

To do so, interchange the injection valves with the greatest and the least deviations one for the other.

If the results remain the same, the problem is in the fuel distributor.

If the defect follows the interchanged fuel-injection valves, the cause lies with the fuel-injection valves.

Take out and replace a defective fuel distributor, or defective fuel-injection valves.

E21

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



E22

Comparative meas. of fuel deliveries
Audi 4000 four-wheel drive (USA)



Note on the fuel-injection valve part number:

The fuel-injection valves installed in the Audi 4000 four-wheel drive vehicle have the part number 0 437 502 026 (original equipment) or .. 027 (sales designation). These valves have a firmly pressed on air guide cap (for the air shrouding system). For replacements, order valves with the sales designation .. 027 above and not according to the designation .. 023 as stamped in on the valve stem.

17.6 Finishing up

Put new seal rings (O-rings on the valve shaft) on the fuel-injection valves. Part number 3 430 210 600. Put the fuel-injection valves back in place.

Reconnect the electrical safety circuit. (Put on the relay.) Reconnect the lead plug on the electro-hydraulic pressure actuator.

In a test run, make certain that no line connections leak.

Then check the idle adjustment and if need be correct it.

Idle adjustment has been described at Coordinates G 21.



18. Checking the correction functions using the universal test adapter ETT 018.01 - 0 684 101 801, the KE-Jetronic test lead 1 684 463 135, and a commercially-available multimeter.

18.1 Instructions for the trouble-shooting program below

The program has been organized into three columns of boxes: The boxes in the column at the left present the best sequence for the test steps. At the same time, each box includes all the necessary instructions on operation of the universal test adapter and tester, the test conditions, the test procedure, and the test specifications.

The column at the middle contains the instructions required for each test step for trouble-shooting and correction.

In the column at the right, supplementary instructions - as required - are provided in the form of figures or diagrams.

The sequence of the test steps represents the best procedure. Always carry through the entire program because the individual test steps build upon one another. It is necessary to switch over to the column of boxes at the center only if the test specifications or functional requirements are not met in a test step.

Important information on electrical safety circuit:

The voltage supply for the electrical components in accordance with the circuit diagram on Coordinate B1 is in line with the series version. Accordingly, the safety circuit has to be jumpered for testing the electric fuel pump, the lambda sensor heater and for all pressure and fuel-delivery tests. The components - control unit, idle actuator and throttle-valve switch - are supplied via terminal 15 (ignition switch) with the result that switching on the ignition is sufficient for testing the above. This version is taken into account in the following trouble-shooting program.



For a limited period following the start of series production of the Audi 4000 4-wheel drive all components were actuated via the electronic speed relay (pump relay). This means that the safety circuit also has to be jumpered for testing the control unit, the idle actuator, and the throttle-valve switch.

In case of doubt, the actual circuitry is therefore to be determined.

Jumpering electrical safety circuit:

The electronic speed relay is located in the central-electrics unit on the left in the direction of travel in the instrument housing, relay position 10.

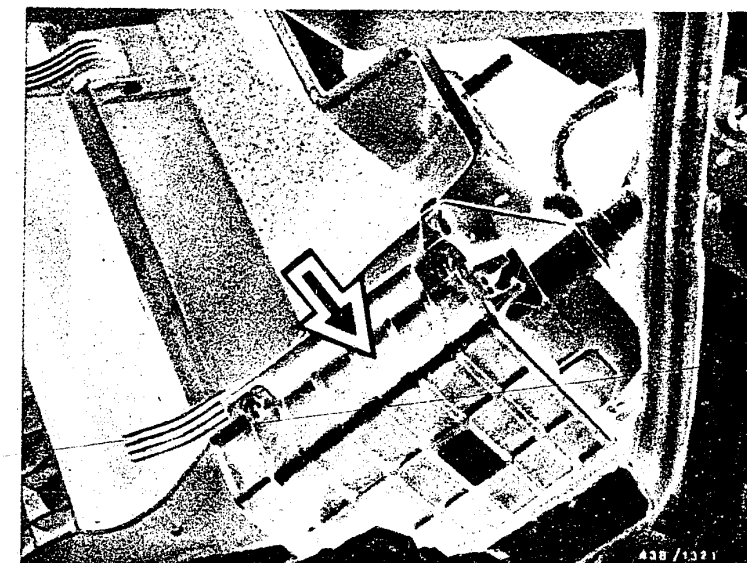
To effect jumpering, remove relay and jumper the sockets 30 and 87 with auxiliary lead. Provide auxiliary lead with fuse element and fuse 16 A. Width of blade terminals 9.5 mm.

Important: jumpering means that the electric fuel pump always runs. When the pump is running, never lift the air-flow sensor plate as this causes fuel to be injected. The accumulation of fuel in the combustion chamber can lead to severe engine damage when subsequently actuating the starter. When effecting jumpering for purely electrical tests, disconnect pump for safety reasons.



18.2 Connecting the universal test adapter:

Connection is made directly to the KE-control unit. The control unit (and the pressure sensor) is located in the passenger compartment, under the dashboard on the right, and is fastened to the outside of the glove compartment. To make the control unit accessible, take the glove compartment out. The control unit can be pushed out of the bracket in the direction of the connection plug.

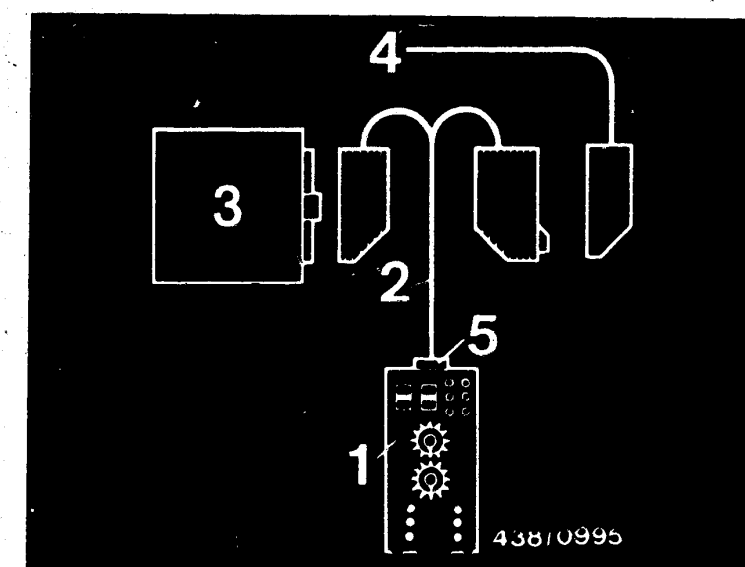


- 1 = Universal test adapter
- 2 = System adapter lead
- 3 = Control unit
- 4 = System wiring harness
- 5 = Pin terminal

Disconnect multiple plug on the control unit. (Press the plug detent back and first flip the plug up at the side of the detent.) Connect the lead plug to the edge connector of the test lead of the universal test adapter.

The multiple plug of the test lead is designed for connection to the control unit. However, connection is permissible only for certain tests in the test chart below. In this regard, follow the note to this effect in each test step.

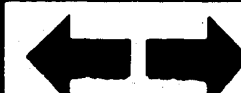
Important note: never detach or connect the plug of the control unit with the engine running, the ignition switched on or the safety circuit jumpered. Connect the multimeter (e.g., Mielco Master 50 K) to the test sockets provided for the measurements in question on the universal test adapter (V, Ω , 1 - 2 for measurements of current) in accordance with instructions from the manufacturer.

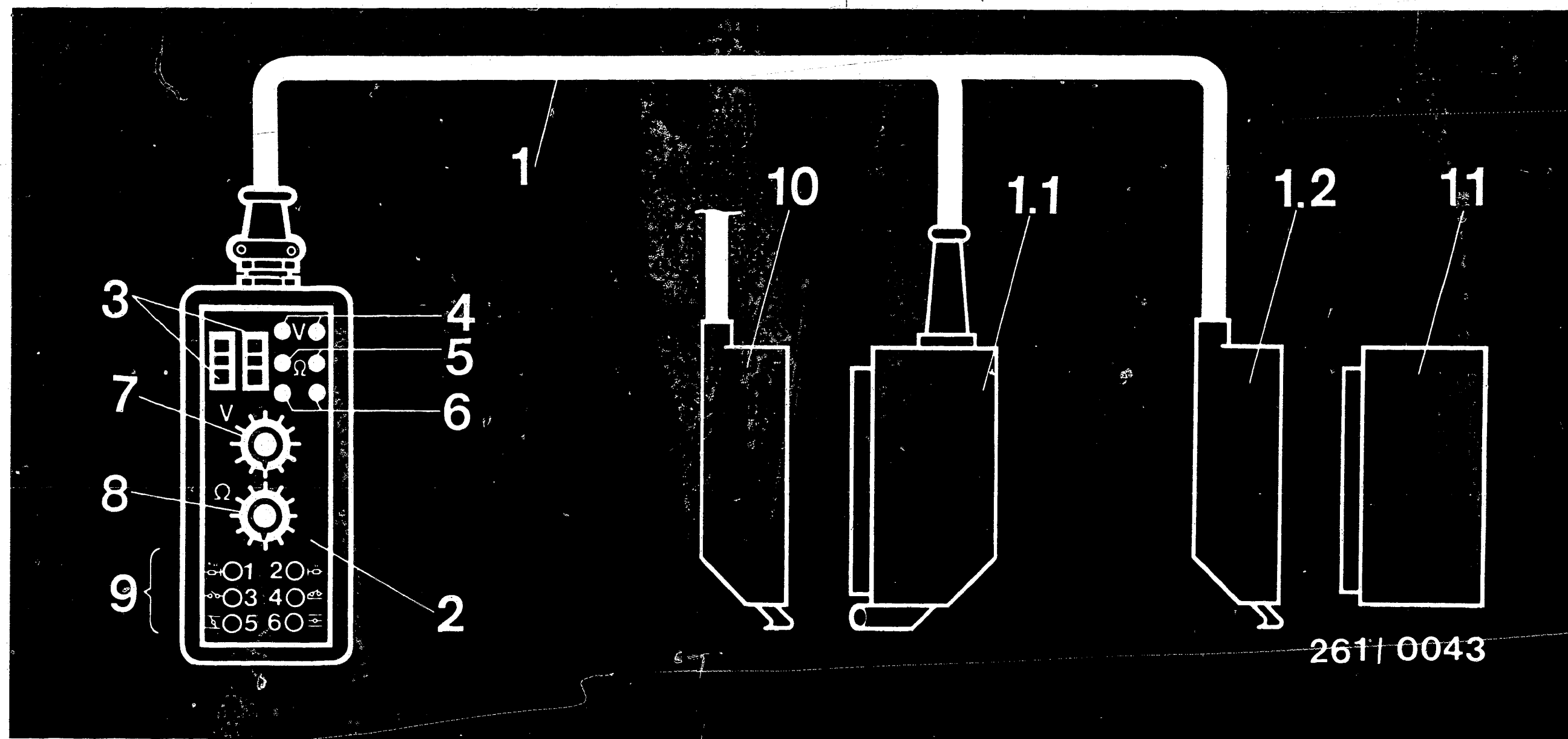
**F2**

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)

**F3**

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)





18.3 Structure and use of the universal test adapter:

- 1 = Test lead for KE-Jetronic 1 684 463 135
- 1.1 = Connection to the wiring harness
- 1.2 = Connection to the control unit
- 2 = Universal test adapter ETT 018.01 - 0 684 101 801
- 3 = Test wells for motortester (not used for the KE-Jetronic)
- 4 = Test sockets for measuring voltage
- 5 = Test sockets for measuring resistance
- 6 = Test sockets for measuring current
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Buttons for simulation of operating conditions
 - Button 1 = Simulation of "cold" engine (-20°C)
 - Button 2 = Simulation of "warm" engine (approx. +80°C)
 - Button 3 = Not assigned for KE-Jetronic
 - Button 4 = Simulation of "activation of starting motor"
 - Button 5 = Simulation of "idle" throttle valve switch
 - Button 6 = Simulation of "full load" throttle valve switch
- 10 = Multiple plug for the KE-Jetronic wiring harness
- 11 = Control unit

F4

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)

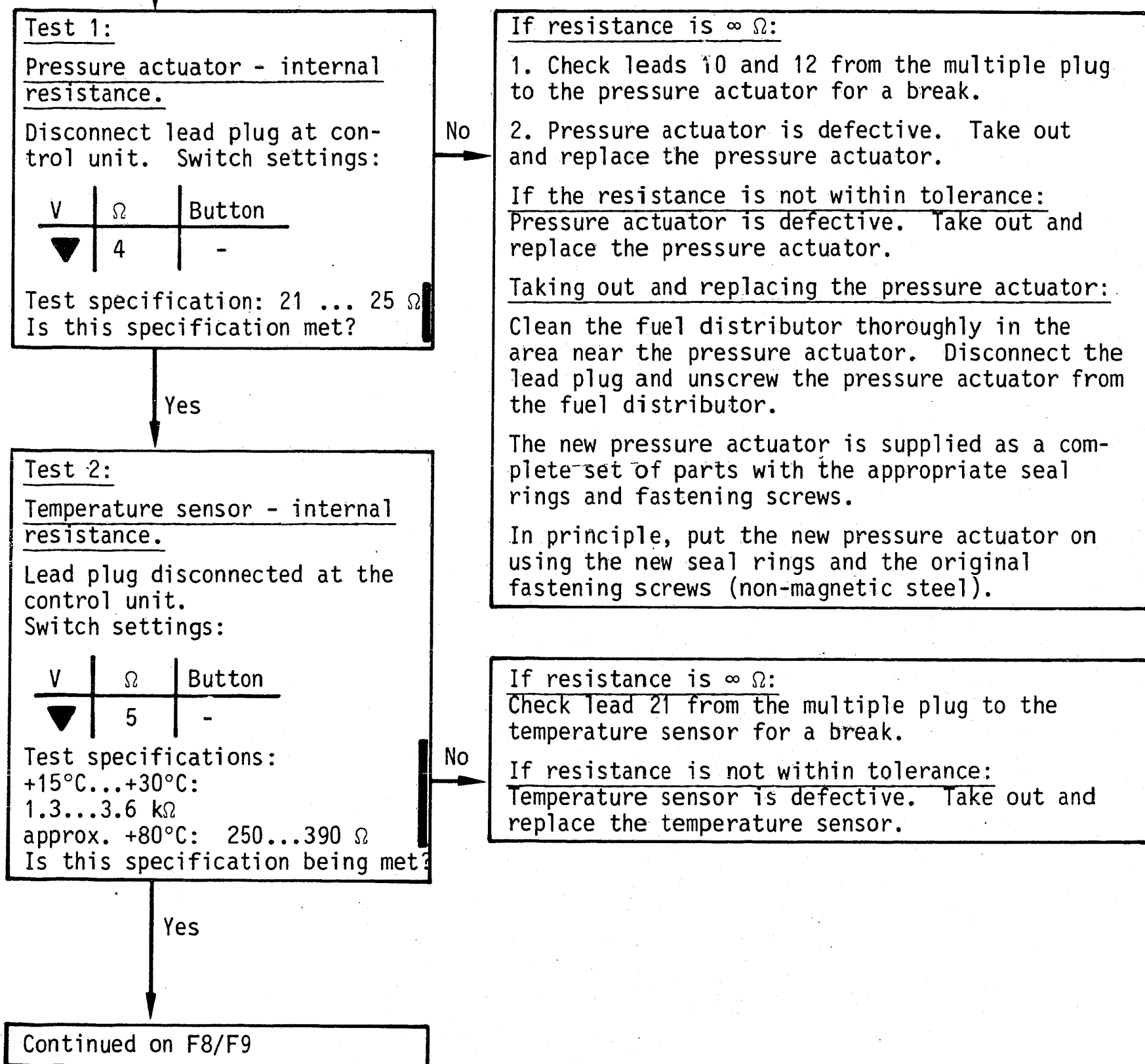


F5

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



18.4 Test chart for universal test adapter



F6

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



F7

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



Test 3
Ground control unit - output stage
 Lead plug disconnected at control unit.
 Switch settings:

V	Ω	Button
▼	11	-

Test specification: 0...10 Ω

Yes

Test 4
"Idle" throttle valve switch
 Lead plug disconnected at the control unit.
 Switch settings:

V	Ω	Button
▼	9	-

Note: Measurement of voltage; connections for the voltmeter:
 Neg. = Black socket "V"
 Pos. = Blue socket on left " Ω "

Switch on ignition.
 Test specifications:
 1. Throttle valve closed: 8...15 V
 2. Throttle valve open: 0 V
 3. Switch-over point for the switch within idle travel of linkage, before the throttle valve is moved.

Continued on F10/F11

Result of measurement $\infty \Omega$:

Test leads 2 and 20 from multiple connector to ground for open-circuits. Eliminate any open-circ.

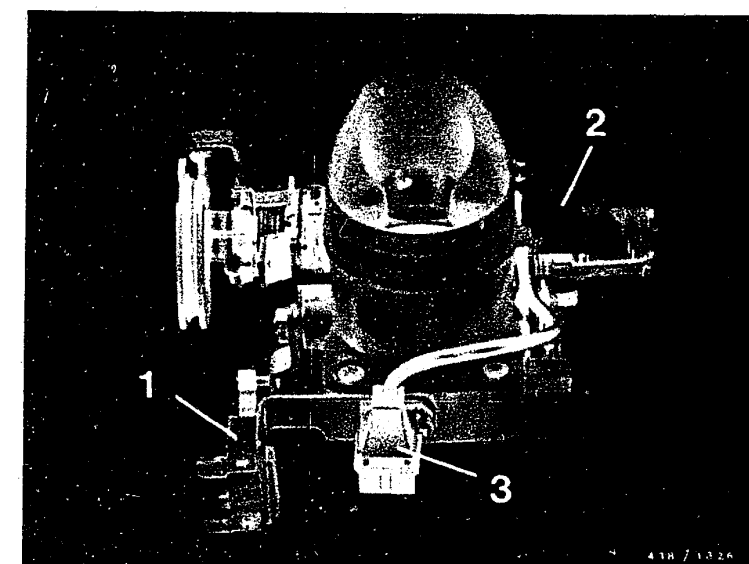
Check switch operation directly at the throttle valve switch using an ohmmeter.
 Take out and replace a defective throttle valve switch (Audi service part).

Note: The direct testing of the throttle valve switch can be done at the separate plug connector (3) (shown here on the throttle valve assembly out of the vehicle).

If the switch operation is OK, but there is no reading for voltage with the throttle valve closed, check the following leads:

1. Positive supply lead from the "full load" throttle valve switch to the "idle" throttle valve switch.
2. Lead from terminal 15 - ignition switch via fuse 24 - central-electrics console to throttle-valve switch "full load".
3. Lead 13 from the multiple plug to the "idle" throttle valve switch.

Eliminate any break in lead.



- 1 = Full load throttle valve switch
- 2 = Idle throttle valve switch
- 3 = Plug connection for idle throttle valve switch

F8

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



F9

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



Test 5

"Full load" throttle valve switch

Lead plug disconnected at the control unit.

Switch settings:

V	Ω	Button
▼	10	-

Note: Measurement of voltage.

Connection for the voltmeter:

Neg. = Black socket "V"

Pos. = Blue socket at left " Ω "

Switch on ignition.

Test specifications:

Throttle valve switch closed: 0 V

Throttle valve switch fully open: 8...15 V

No

Check the switch operation directly on the throttle valve switch (1) using an ohmmeter.

Take out and replace a defective throttle valve switch (Audi service part).

If the switch operation is OK but there is no reading for voltage with the throttle valve fully open, check the following leads:

1. Lead from terminal 15 - ignition switch via fuse 24 - central-electrics console to throttle-valve switch "full load".
2. Lead 5 from the multiple plug to the "full load" throttle valve switch.

Yes

Continued on F12/F13

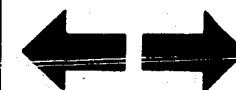
F10

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



F11

Testing with universal test adapter
Audi 4000 four-wheel drive. (USA)



Test 6
 Starting signal, Term. 50 -
 starting motor
 Lead plug disconnected at the
 control unit.

Switch settings:

V	Ω	Button
4	-	-

Run the starting motor
 briefly.

Test specification: 8...15 V

No

Check lead 24 from the multiple plug to the
 starting motor for a break..
 Eliminate any break.

Test 7
 TD signal (ignition signal)
 Lead plug is disconnected at
 the control unit.

Switch settings:

V	Ω	Button
5	-	-

Run the starting motor for a
 few seconds.

Test specifications: No de-
 fined test specification has
 been prescribed. It is
 sufficient merely to determine
 that the signal is coming.
 Depending on the design of
 the voltmeter, a value of
 approx. 5 V is displayed.

No

Check lead from Terminal 1 of the ignition
 trigger box to the multiple plug, Terminal
 25, for a break.
 Eliminate any break.

Yes

Continued on F14/F15

Test 8

Power supply to control unit

Lead plug disconnected at the control unit.

Switch setting:

V	Ω	Button
9	-	-

Switch on ignition:

Test specifications: 8...15 V

No

Test lead from terminal 15 - ignition switch to connection 1 of multiple connector for open-circuit.

Eliminate any break.

Yes

Test 9

Power supply, potentiometer in the air-flow sensor and pressure sensor (altitude sensor)

Connect the control unit.

Switch settings:

V	Ω	Button
7	-	-

Switch on ignition:

Test specification: 7...8 V

No

No reading, or an incorrect reading:

Control unit defective.

Take out and replace the control unit.

Yes

Continued on F16/F17

F14

Testing with universal test adapter

Audi 4000 four-wheel drive (USA)



F15

Testing with universal test adapter

Audi 4000 four-wheel drive (USA)



Test 10

Signal of the potentiometer
on the air-flow sensor

Control unit connected.

Switch settings:

V	Ω	Button
8	-	-

Switch on ignition.

1. Air-flow sensor plate
in its zero position: 0 V.

2. Air-flow sensor plate
in its basic position (Fig.
at top): 0...0.5 V

3. Deflect the air-flow
sensor plate by hand:
Voltage rises to max. 8 V.

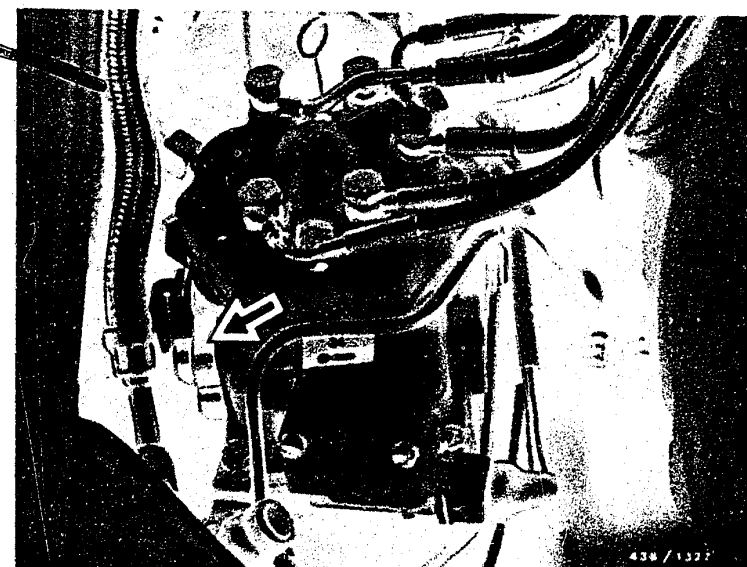
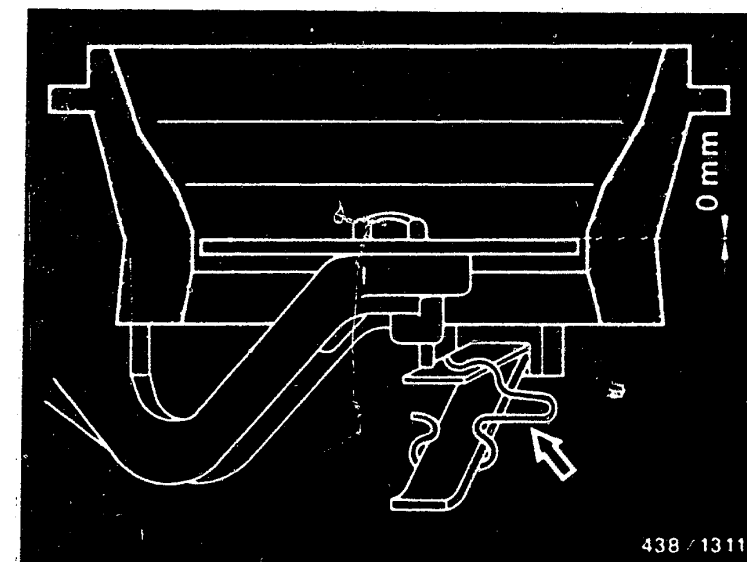
No

1. No signal in any of 3 test points:
Check leads 14 (-) and 17 (wiper voltage)
from the multiple plug to the potentiometer
for a break.
If not due to a break, check the poten-
tiometer with an ohmmeter directly at the
connecting pins for open circuit.
Take out and replace a damaged potentiometer
(see 3.).

2. Incorrect values in all 3 test points:
Adjust the potentiometer (see 3.). If no
adjustment is possible, take out and re-
place the potentiometer, and adjust the new
one.

3. Taking out and replacing, or adjusting
the potentiometer:

Remove the air box, air-flow sensor - throttle
valve assembly. Unscrew the fastening screws
for the air-flow sensor and lift the entire
mixture-control unit somewhat with the lines
and the diaphragm-type pressure regulator
connected to it, so that the fastening screws
for the potentiometer are accessible. Place
a support under the mixture-control unit.
Scratch the sealant from the 4 fastening screws
and unscrew the complete potentiometer housing.
Important instructions: The sensitive poten-
tiometer wiper must not be touched. It has
been adjusted in the factory (position, con-
tact force) and can neither be corrected nor
taken out and replaced.
Screw the new potentiometer housing on care-
fully, using a new seal ring. Merely finger-
tighten it.



Yes

Continued on F18/F19

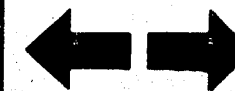
F16

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



F17

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Continued

Adjusting the potentiometer:

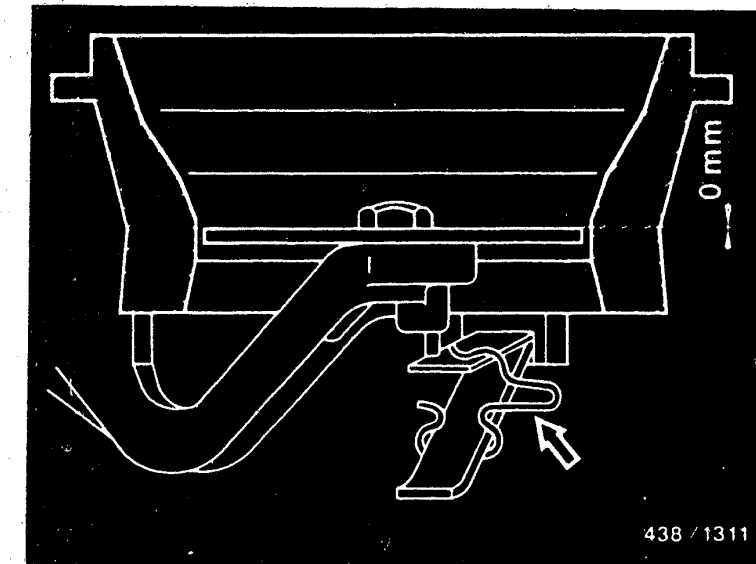
Lock the air-flow sensor plate in its basic position.

Definition of the basic position: Upper edge of the air-flow sensor plate flush with the transition edge from the cylindrical section to the air funnel.

Visual inspection on the outside of the air-flow sensor.

Adjust the potentiometer in the area near the long holes in such a way that the voltage is 0...0.05 V, i.e., that even when the air-flow sensor plate is raised just slightly above the basic position, there must be an increase in voltage.

Tighten the fastening screws to a tightening torque 5...5.5 Nm and secure in place with a black sealing agent (e.g., Terrosen).



438 / 1311

Yes

Test 11

Idle actuator - power supply and continuity, coil 1

Disconnect lead plug at the control unit.

Switch setting:

V	Ω	Button
10	-	-

Switch on ignition.

Test specification: 8...15 V

No

No reading:

1. Test lead terminal 15 - ignition switch to terminal 2 at idle actuator (arrow).

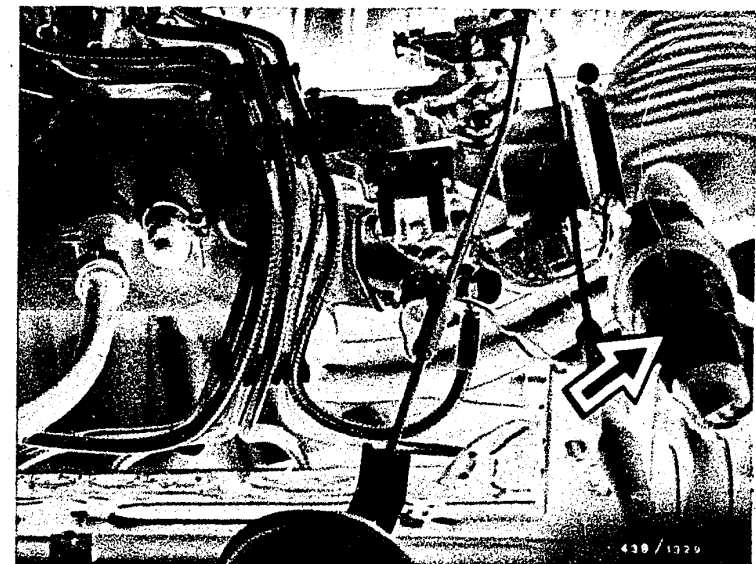
2. Check the lead from Term. 3 on the idle actuator to connection 3 on the multiple plug. Eliminate any break.

3. Using an ohmmeter directly on connections 2 and 3 of the idle actuator, check coil 1 for continuity.

If there is no continuity, take out and replace the idle actuator.

Yes

Continued on F20/F21



439 / 1320

F18

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



F19

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 12

Idle actuator - continuity, coil 2

Lead plug disconnected at the control unit.

Switch settings:

V	Ω	Button
11	-	-

Switch on ignition.

Test specification: 8...15 V

No

No reading:

1. Check the lead from Term. 1 on the idle actuator to connection 4 on the multiple plug.

Eliminate any break.

2. Using an ohmmeter directly on connections 1 and 2 of the idle actuator, check coil 2 for continuity.

If there is no continuity, take out and replace the idle actuator.

Yes

Test 13

Signal from air conditioner

Lead plug disconnected at the control unit.

Switch settings:

V	Ω	Button
12	-	-

Switch on ignition.

Switch on the air conditioner.

Test specification: 8...15 V

No

No reading:

Check lead 19 from the multiple plug to the air conditioner switch (dashboard) for break.

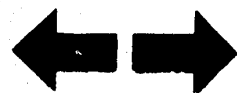
Eliminate any break.

Yes

Continued on F22/F23

F20

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



F21

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 14

Signal - potentiometer of
the pressure sensor
(altitude sensor)

Connect control unit.

Switch settings:

V	Ω	Button
13	-	-

Switch on ignition.

The wiper voltage shown de-
pends on altitude:

0 meter	= approx. 6.5 V
500 meter	= approx. 5.6 V
1000 meter	= approx. 4.8 V
1500 meter	= approx. 4.0 V
2000 meter	= approx. 3.2 V
3000 meter	= approx. 2.0 V

Yes

Continued on G1/G2

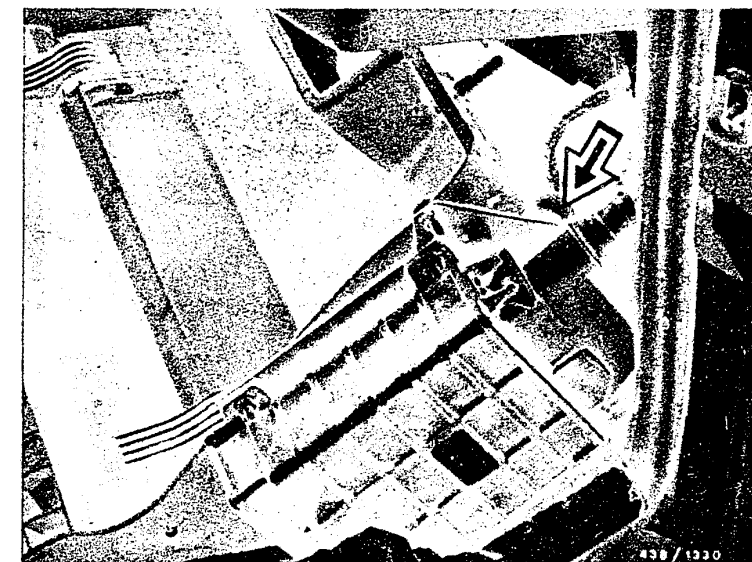
No reading:

Possible breaks in the following leads:

1. Connection 18 of the multiple plug to Term. 2 of the pressure sensor.
2. Connection 11 of the multiple plug to Term. 1 of the pressure sensor.

Incorrect reading:

1. Possible break in lead 14 from the multiple plug to Term. 3 of the pressure sensor.
2. Pressure sensor is defective. Take out and replace the pressure sensor.



Arrow = Altitude sensor
(partially concealed)

F22

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



F23

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 15

Lambda control - closed-loop control operation
Control unit connected.

V	Ω	Button
14	24	-

Jump sockets 1 and 2 on the test adapter.

Start the engine and warm it up.

Test specification:

Closed-loop control: Pulsing reading for voltage.

Average value: approx. 3 V

Yes

Test 16

Warm-up enrichment - -20°C

Control unit connected.
Disconnect lead plug at the pressure sensor (altitude sensor).

Switch settings:

V	Ω	Button
-	21	1

Ammeter scale 0...100 mA.

Switch on ignition.

Test specification: 51...71 mA

Yes

Continued on G3/G4

1. No reading for voltage:

Control unit defective. Take out and replace the control unit (arrow).

2. No pulsing in reading for voltage, but merely a static value of approx. 3 V:

2.1 Separate the connecting lead for the lambda sensor (the plug connection in question in the sensor lead is located in the area between the cylinder head and the engine bulkhead). Hold the lead on the control unit end to ground.

Reading for voltage increases. If no reaction occurs, the cause may be the following:

- Break in the sensor lead to connection 8 on the multiple plug. Eliminate any break.
- Control unit defective. Take out and replace the control unit.

2.2. If there is a rise in voltage when the sensor lead is grounded:

Lambda sensor (arrow) is defective. Take out and replace the lambda sensor.

Before installing a new sensor, coat its thread with special assembly paste VS 14 016 Ft (5 964 080 105). Coat only turns of thread.

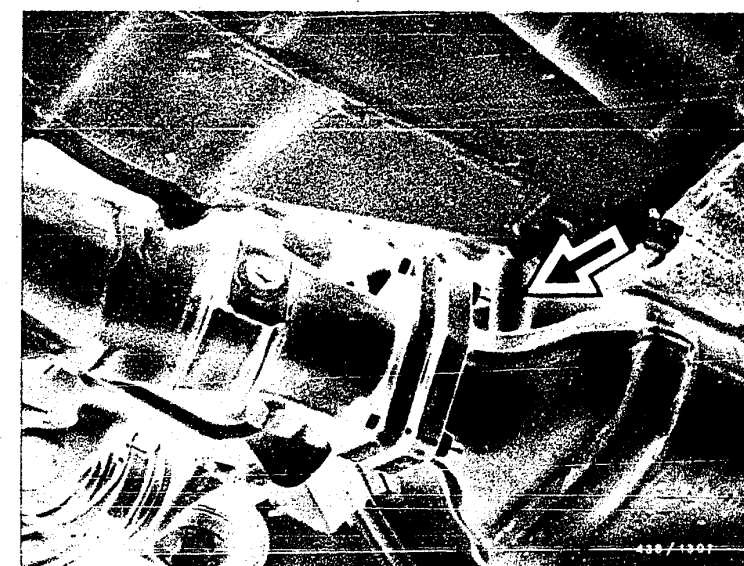
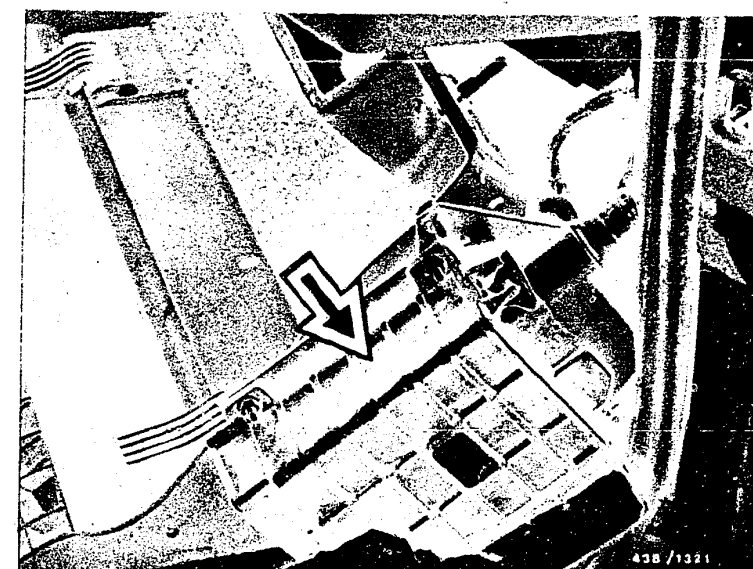
It is not permissible to get any paste into the slits.

3. Incorrect value: Adjustment within the scope of idle-speed adjustment, coordinate G21.

No reading or incorrect reading:

Control unit defective.

Take out and replace the control unit.



G1

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G2

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 17
Cut back for the warm-up enrichment
(actuator current with engine at
normal operating temperature)
 Control unit connected.
 Lead plug disconnected at the pressure
 sensor (altitude sensor).
 Switch settings:

V	Ω	Button
-	21	2

Ammeter scale:
 0 ... 100 mA.
 Switch on ignition.
 Test specification: 9...11 mA

No

No reading or incorrect reading:
 Control unit defective.
 Take out and replace the control
 unit.

Yes

Test 18
Starting enrichment
 Control unit connected.
 Lead plug disconnected at the pressure
 sensor (altitude sensor).
 Switch settings:

V	Ω	Button
-	21	2/4

Ammeter scale:
 0 ... 100 mA.
 Switch on ignition.
 Testing: Continue pressing button 2.
 Press button 4: Current rises to
 80 ... 100 mA.
 Cuts back in approx. 1 second.

No

No reading or incorrect reading:
 Control unit defective.
 Take out and replace the control
 unit.

Yes

Continued on G5/G6

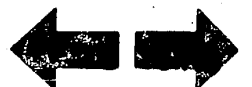
G3

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



G4

Testing with universal test adapter
 Audi 4000 four-wheel drive (USA)



Test 19

Post-start enrichment

Control unit connected.

Lead plug disconnected at the pressure sensor (altitude sensor).

Switch settings:

V	Ω	Button
-	21	1/4

Ammeter scale:

0 ... 300 mA.

Switch on ignition coil.

Test specifications: Continue pressing button 1: 51 ... 71 mA.

Briefly press button 4 and release. Increase to: 130 ... 150 mA.

After remaining a short time:

Cuts back to: 51 ... 71 mA.

Cut-back time: approx. 90 sec.

Incorrect reading or
incorrect behavior:

Control unit is defective.

Take out and replace the control unit.

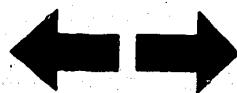
No

Yes

Continued on G7/G8

G5

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G6

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 20

Acceleration enrichment

Control unit connected.

Switch settings:

V	Ω	Button
-	21	1

Ammeter scale:
0 ... 300 mA.

Important:

Disconnect the electric fuel pump electrically (separate the electrical connection), in order to prevent fuel injection when moving the air-flow sensor plate.

Jump the safety circuit.

Test specification: Button 1
51 ... 71 mA.

Open the throttle valve somewhat and raise the air-flow sensor plate quickly:

Current rises briefly to:

130 ... 150 mA

Cut-back time: approx. 1 sec.

Incorrect reading or
incorrect behavior:

Control unit defective.

Take out and replace the control unit.

No

Yes

Continued on G9/G10

G7

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G8

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 21/1

Overrun cutoff

Control unit connected.

Switch settings:

V	Ω	Button
-	21	2

Reverse terminals on ammeter
(interchange positive and negative)
Scale: 0...100 mA.

Testing:

Start the engine and hold it at
1800...2000 min⁻¹. While pressing
button 2, activate the "idle" throttle
valve switch by hand. The engine
hunts. Reading for current during
the dropping engine speed phase:
40 ... 50 mA.

Yes

Test 21/2

Additional test for vehicle with
cruise control: Suppression of
overrun cutoff

There must not be any overrun cutoff
function when the cruise control is
switched on.

Yes

Continued on G11/G12

No

Incorrect reading or
incorrect behavior:

Control unit defective.

Take out and replace the control
unit.

No suppression of the overrun
cutoff:

Note: The cruise control can
be switched on only with the
vehicle driving. There must be
a negative signal at connec-
tion 6 of the multiple plug
when the cruise control is
switched on. Check lead 6 to
the control unit for the
cruise control for a break.

Eliminate any break.

G9

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G10

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 22

Lambda closed-loop control

Control unit connected.

Switch settings:

V	Ω	Button
	24	

Normal connections for ammeter:
Scale: 0 ... 30 mA.

If measurements are being taken at an elevation greater than 600 m, disconnect the lead plug on the altitude sensor.

Testing: Start the engine, warm it up, and operate at idle speed. Closed-loop operation of the lambda control can be identified from the pulsing reading for current. Average value: 4 ... 16 mA.

Activate the full load throttle valve switch (at the top on the throttle valve assembly).
(Simulation of full load).

The control unit switches from closed-loop to open-loop operation (static reading for current).

Reading for current: 12 ... 14 mA.

No

1. No control function, static reading approx. 10 mA:
 - * Perform continuity tests on the lead from control unit term. 8 to plug of lambda sensor. If necessary, eliminate open-circuit. If no fault present:
 - * Switch ohm switch to setting 22. Current value must increase. If no reaction: control unit defective. Replace control unit.
If O.K.:
 - * Lambda sensor defective. Replace sensor.
2. Current value 0 or approx. 20 mA.
 - * Test lead from control unit term. 8 to lambda sensor for short-circuit to ground (e.g. shielding) or to battery voltage (e.g. lead of sensor heater). If necessary, eliminate short-circuit. If no fault present:
 - * Exhaust setting incorrect (too rich or too lean). Adjust (idle-mixture-adjusting screw) to mean current value 9 ... 11 mA.
3. Only mean value incorrect:

Adjust (idle-mixture-adjusting screw) to mean current value 9 ... 11 mA.
4. No full-load reaction:

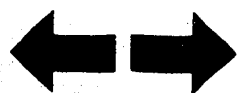
Control unit defective. Replace control unit.

Yes

Continued on G13/G14

G11

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G12

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 23

Lambda closed-loop control -
rich stop

Switch settings:

V	Ω	Button
	22	-

The lead plug remains disconnected
at the pressure sensor.

The test can be run with the engine
running. If the test is done with
the engine at standstill, switch on
ignition.

After switching to setting 22:
Current rises to: max. 20 mA.

No

No reading, or no change in
current:

Control unit defective.

Take out and replace the control
unit.

Yes

Continued on G15/G16

G13

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G14

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 24

Lambda closed-loop control -
lean stop

Switch settings:

V	Ω	Button
	23	-

Lead plug remains disconnected at
the pressure sensor.

The test can be run with the engine
running. If the test is run with
the engine at standstill, switch on
ignition.

After switching to setting 23:
Current drops to:

Less than 2 mA.

Engine runs rough (leaning) of
mixture).

No

No change in current:

Control unit defective.

Take out and replace the control
unit.

Yes

Continued on G17/G18

G15

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G16

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



Test 25/1

Idle speed control

Control unit connected.

Switch settings:

V	Ω	Button
10	-	-

Test run using lambda closed-loop control tester KDJE-P 600. Connection: Connect the large clamps (red-positive, black-ground) directly to the vehicle battery. Blue measuring lead to red "V" socket or test recess.

Press button "IR" on the tester.

Have the engine at normal operating temperature and run it at idle speed.

Idle speed (set by the control): $800 \pm 20 \text{ min}^{-1}$.

With on/off ratio:
 $28 \pm 1 \%$.

No

1. Engine hunts, on/off ratio varies:

Idle actuator is not moving freely. Take out and replace the idle actuator. (Arrow - photo at top)

2. Idle speed too high, on/off ratio 25% or less:

Idle actuator is sticking. Take out and replace the idle actuator.

3. Idle speed too low, on/off ratio greater than 90%:

Idle actuator is sticking. Take out and replace the idle actuator.

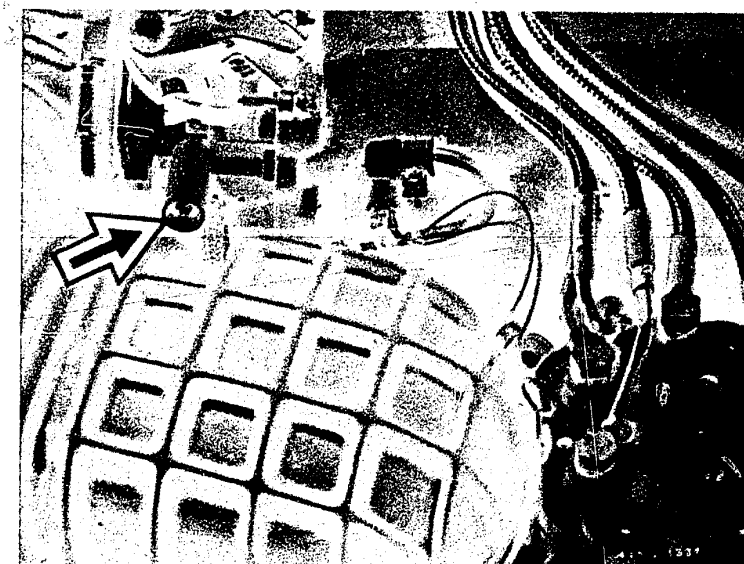
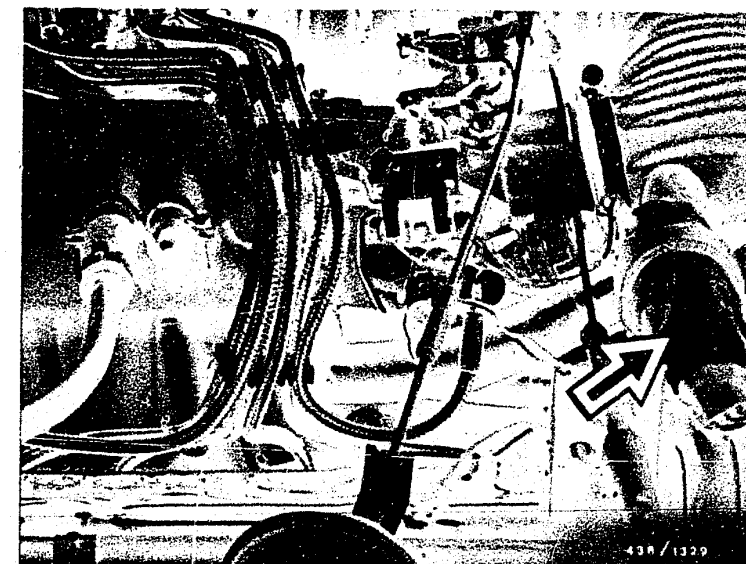
4. Idle speed incorrect, no reading for on/off ratio:

Control unit is defective. Take out and replace the control unit.

5. Idle speed OK, on/off ratio incorrect:

Adjust the on/off ratio by adjusting the bypass screw (arrow - lower photo) on the throttle-valve assembly.

Turning clockwise: Higher on/off ratio.
Turning counter-clockwise: Lower on/off ratio:



Continued on G19/G20

G17

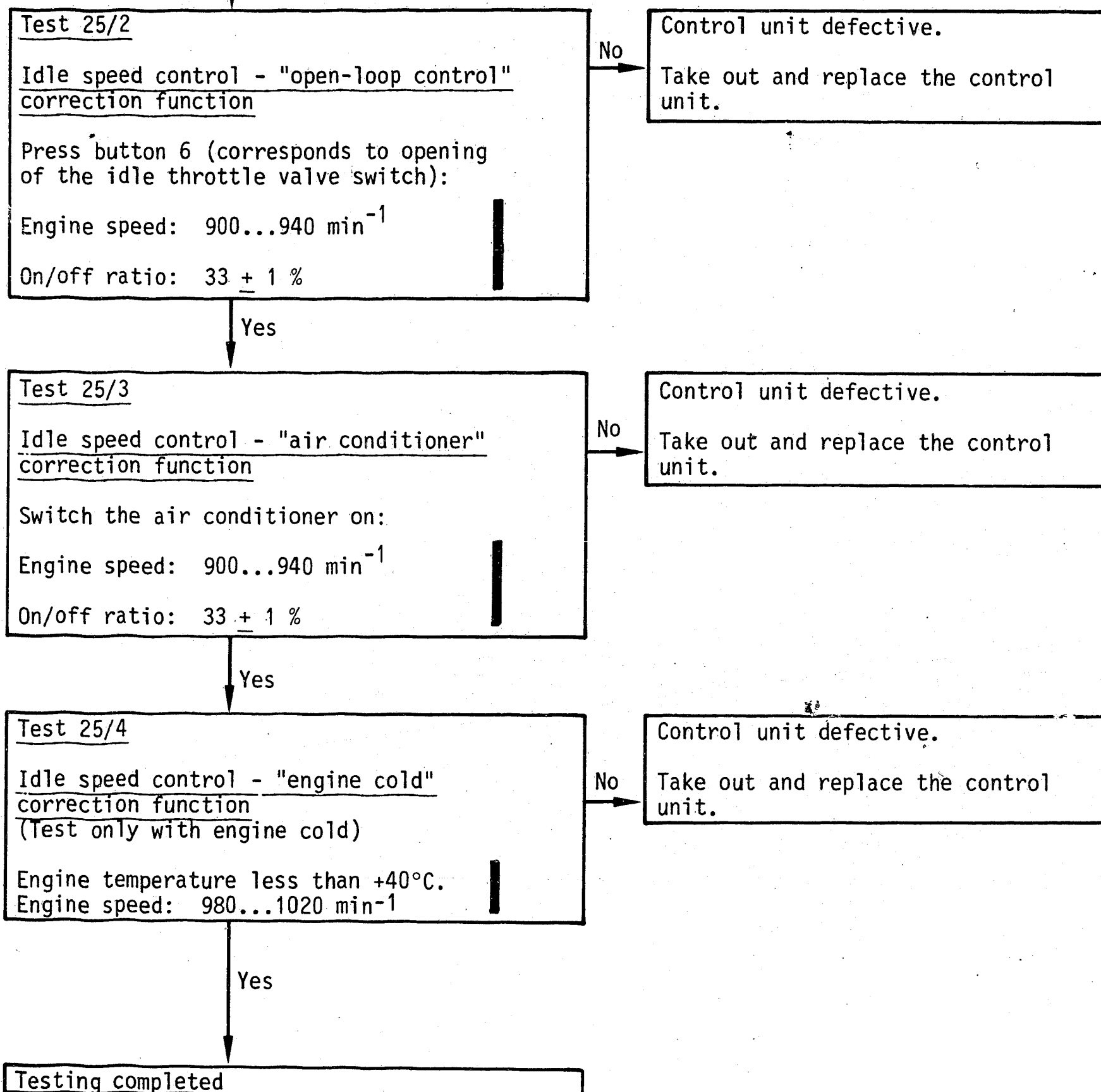
Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



G18

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)





19. Idle adjustment

19.1 General instructions:

In the case of the Audi 4000 four-wheel drive vehicle, the idle speed is controlled automatically by the lambda closed-loop control (mixture control) and idle speed control supplementary systems. As a result, the method using adjustment of the CO and engine speed otherwise used is not used here. On the other hand, it is necessary to check that the two systems are operating at the prescribed working point for their prescribed working range. If need be, these working points are to be adjusted. An additional check measurement for CO is used to determine whether or not there is a leak in the exhaust system.

Testing and adjusting are done using the universal test adapter ETT 018.01 - 0 684 101 801, test lead 1 684 463 135, and the lambda closed-loop control tester KDJE-P 600.

The on/off ratios of the idle speed control are measured using the lambda closed-loop control tester.

G21

Idle adjustment

Audi 4000 four-wheel drive (USA)



G22

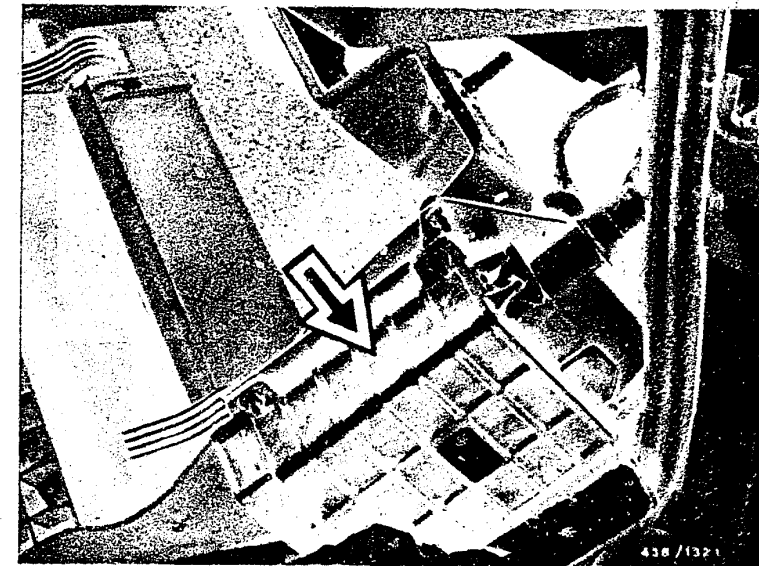
Idle adjustment

Audi 4000 four-wheel drive (USA)



19.2 Connecting the universal test adapter:

Connection is made directly to the KE-control unit. The control unit (and the pressure sensor) is located in the passenger compartment, under the dashboard on the right, and is fastened to the outside of the glove compartment. To make the control unit accessible, take the glove compartment out. The control unit can be pushed out of the bracket in the direction of the connection plug.

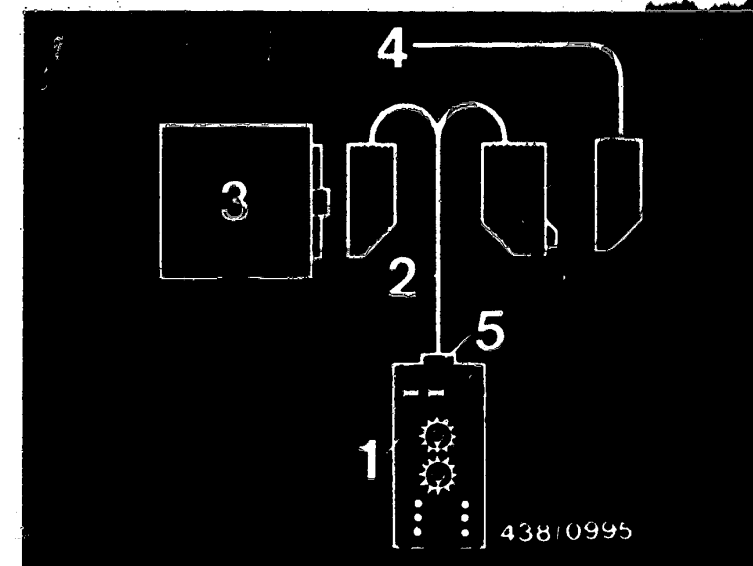


- 1 = Universal test adapter
- 2 = System adapter lead
- 3 = Control unit
- 4 = System wiring harness
- 5 = Pin terminal

Disconnect multiple plug on the control unit. (Press the plug detent back and first flip the plug up at the side of the detent.) Connect the lead plug to the edge connector of the test lead of the universal test adapter.

Important note: never detach or connect the plug of the control unit with the engine running, the ignition switched on or the safety circuit jumpered.

Connect the multimeter (e.g., Mislco Master 50 K) to the test sockets provided for the measurements in question on the universal test adapter (1 - 2 for measurements of current) in accordance with instructions from the manufacturer.



G23

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



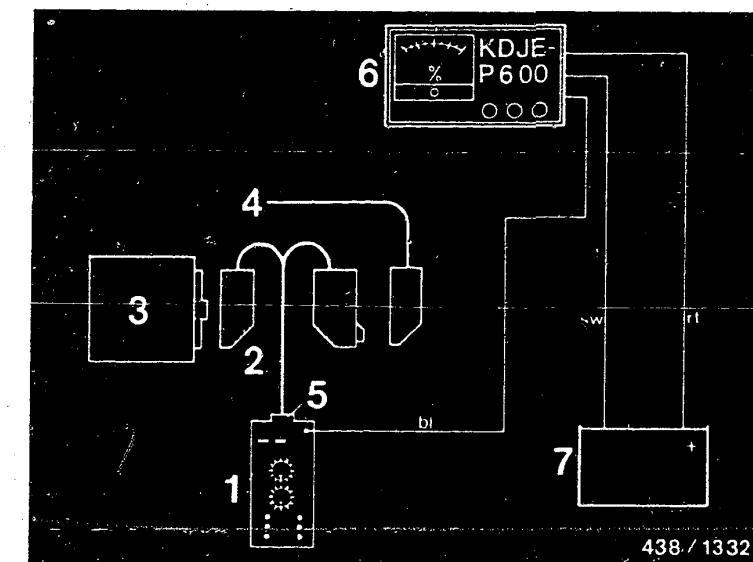
G24

Testing with universal test adapter
Audi 4000 four-wheel drive (USA)



19.3 Connecting the lambda closed-loop control tester KDJE-P 600:

Connect the red clamp (positive) and the black clamp (negative) directly to the vehicle battery. Connect the blue test lead to the red "V" socket or the red test well.



- 1 = Universal test adapter
- 2 = System adapter lead
- 3 = Control unit
- 4 = System wiring harness
- 5 = Pin terminal
- 6 = Lambda closed-loop control tester
- 7 = Vehicle battery

H1

Idle adjustment

Audi 4000 four-wheel drive (USA)



H2

Idle adjustment

Audi 4000 four-wheel drive (USA)



19.4 Procedure for testing and adjusting:

Triggering current for pressure actuator (corresponds to mixture-control adjustment):

Test specifications: Checking value: 4...16 mA
Setting value: 9...11 mA.
CO-level (check value): 0.3...1.2 vol-%.

Warm up the engine and operate it at idle speed. Disconnect the lead plug at the pressure sensor (altitude sensor) if the testing is being done at an elevation greater than 600 m.

Ammeter scale 0...30 mA.

Closed-loop control operation of the control unit can be identified from the pulsing reading for current. This pulsing value for current must not exceed or drop below the limit values 4...16 mA.

Any correction that may be necessary is made by adjusting the idle-mixture-adjusting screw in the air-flow sensor.

Turning clockwise: Lower value for current

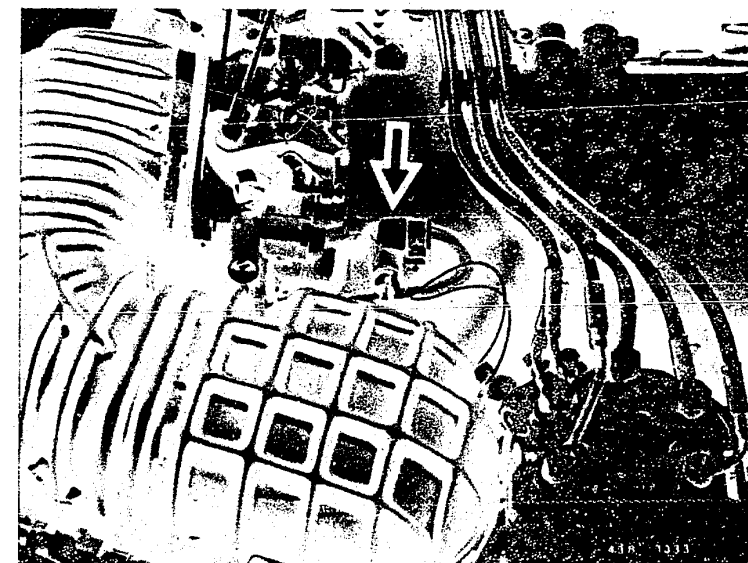
Turning counter-clockwise: Higher value for current

Adjustment to the setting value 9...11 mA.

After adjustment has been made, check the CO-level in the exhaust gas. There is a special exhaust gas sampling pipe (arrow) on the suction pipe for the CO sampling in front of the catalytic converter. The closure cap is removed from this and the exhaust gas hose of the tester is put onto it (without the exhaust gas sensor). If the reading exceeds or drops below the check value 0.3...1.2 vol-%, there is a leak in the exhaust system between the engine and the catalytic converter. To check for leaks, force compressed air into the exhaust system through the exhaust gas sampling pipe and spray joints with a leak detector spray. Bubbling indicates a leak. Eliminate any leak.

Then connect the lead plug at the pressure sensor (altitude sensor). The value for current must drop depending on elevation: Near sea level small, at a great elevation down to almost 0 mA.

If no closed-loop operation takes place, or if it is not possible to adjust the values as prescribed, do the following tests:



H3

Idle adjustment

Audi 4000 four-wheel drive (USA)



H4

Idle adjustment

Audi 4000 four-wheel drive (USA)



Test 1

Lambda control - closed-loop control function

Control unit connected.

Switch settings:

V	Ω	Button
	24	-

Ammeter connected.

Scale 0...30 mA

Disconnect lead plug at the pressure sensor if the testing is being done at an elevation greater than 600 m.

Start the engine and warm it up.

Test specification:

Closed-loop control operation: Pulsing reading for current.

Average value: approx. 10 mA.

No

Yes

Continued on H7/H8

1. No control function, static reading approx. 10 mA:

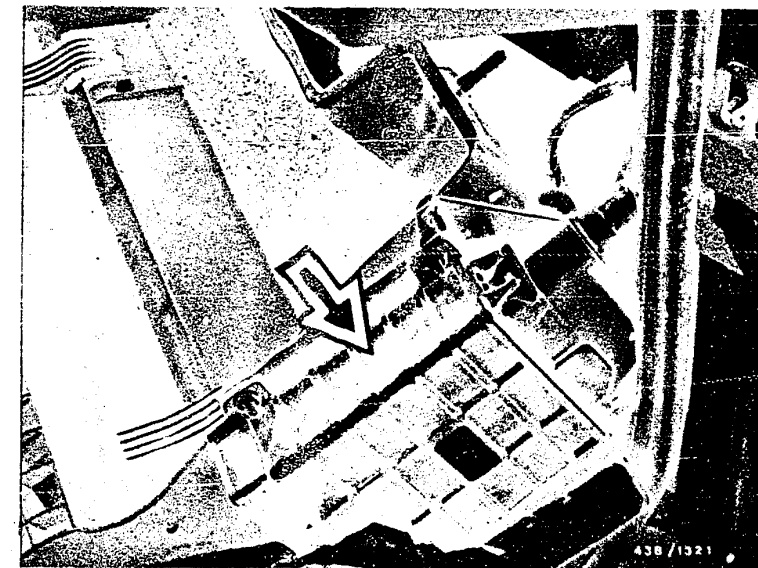
- * Perform continuity tests on the lead from control unit term. 8 to plug of lambda sensor. If necessary, eliminate open-circuit. If no fault present:
- * Switch ohm switch to setting 22. Current value must increase. If no reaction: control unit defective. Replace control unit. If O.K.:
- * Lambda sensor defective. Replace sensor.

2. Current value 0 or approx. 20 mA:

- * Test lead from control unit term. 8 to lambda sensor for short-circuit to ground (e.g. shielding) or to battery voltage (e.g. lead of sensor heater). If necessary, eliminate short-circuit. If no fault present:
- * Exhaust setting incorrect (too rich or too lean). Adjust (idle-mixture-adjusting screw) to mean current value 9 ... 11 mA.

3. Only mean value incorrect:

Adjust (idle-mixture-adjusting screw) to mean current value 9 ... 11 mA.



H5

Idle adjustment

Audi 4000 four-wheel drive (USA)



H6

Idle adjustment

Audi 4000 four-wheel drive (USA)



Test 2

Lambda closed-loop control - rich stop

Switch settings:

V	Ω	Button
	22	-

Lead plug remains disconnected at the pressure sensor.

Test with engine running.

After switching to setting 22:

Current rises to max. 20 mA.

No

No reading, or no change in current:

Control unit defective.

Take out and replace the control unit.

Yes

Test 3

Lambda closed-loop control - lean stop

Switch settings:

V	Ω	Button
	23	-

Lead plug remains disconnected at the pressure sensor.

Test with engine running.

After switching to setting 23:

Current drops to: less than 2 mA.

Engine runs rough (leaning of mixture)

No

No change in current:

Control unit defective.

Take out and replace the control unit.

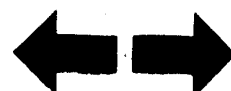
Yes

Testing completed

H7

Idle adjustment

Audi 4000 four-wheel drive (USA)



H8

Idle adjustment

Audi 4000 four-wheel drive (USA)



19.5 On/off ratio (replaces adjustment of engine speed)

Test specifications: Value set by control: $800 \pm 20 \text{ min}^{-1}$
With on/off ratio: $28 \pm 1 \%$

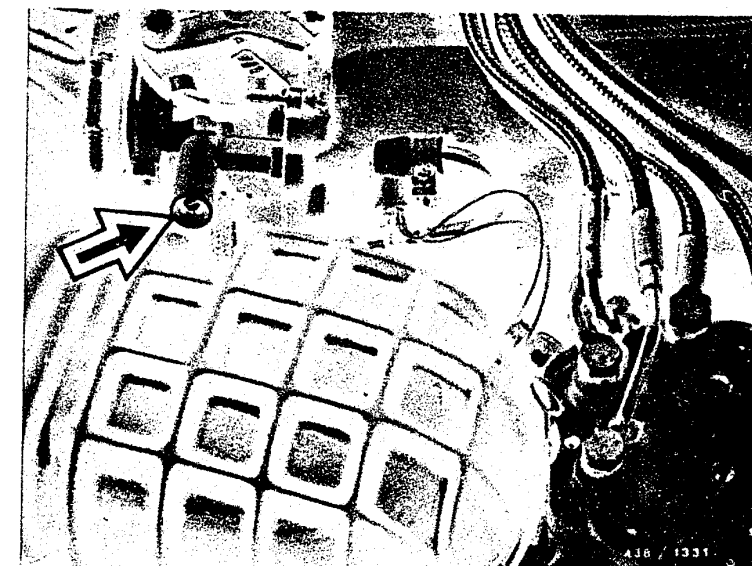
The engine speed is automatically controlled to $800 \pm 20 \text{ min}^{-1}$, which must produce an on/off ratio of $28 \pm 1 \%$.

If need be, the on/off ratio is to be adjusted by adjustment of the bypass screw on the idle actuator (arrow).

Turning clockwise: Higher on/off ratio

Turning counter-clockwise: Lower on/off ratio

If the idle speed is incorrect, unstable, or cannot be adjusted, run the following tests:



H9

Idle adjustment

Audi 4000 four-wheel drive (USA)



H10

Idle adjustment

Audi 4000 four-wheel drive (USA)



Test 1

Idle speed control

Control unit connected.

Switch settings:

V	Ω	Button
10	-	-

Test run using lambda closed-loop control tester KDJE-P 600. Connection: Connect the large clamps (red-positive, black-ground) directly to the vehicle battery. Connect the blue test lead to the red "V" socket or the test well.

Press button "IR" on the tester.

Have the engine at normal operating temperature and run it at idle speed.

Idle speed (set by the control): $800 \pm 20 \text{ min}^{-1}$.

With on/off ratio:
 $28 \pm 1 \%$.

No

1. Engine hunts, on/off ratio varies:

Idle actuator is not moving freely. Take out and replace the idle actuator.

2. Idle speed too high, on/off ratio 25% or less:

Idle actuator is sticking. Take out and replace the idle actuator.

3. Idle speed too low, on/off ratio greater than 90%:

Idle actuator is sticking. Take out and replace the idle actuator.

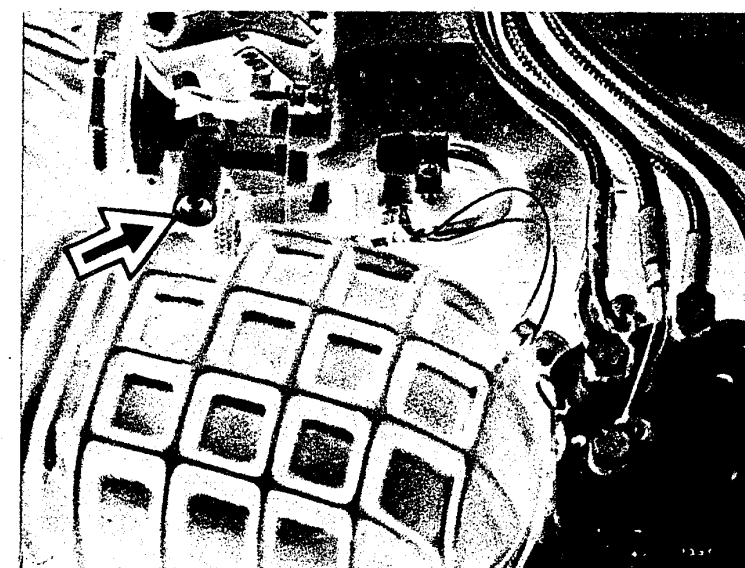
4. Idle speed incorrect, no reading for on/off ratio:

Control unit is defective. Take out and replace control unit.

5. Idle speed OK, on/off ratio incorrect:

Adjust the on/off ratio by adjusting the bypass screw (arrow) on the throttle-valve assembly.

Turning clockwise: Higher on/off ratio.
Turning counter-clockwise: Lower on/off ratio:



Continued on H13/H14

H11

Idle adjustment

Audi 4000 four-wheel drive (USA)

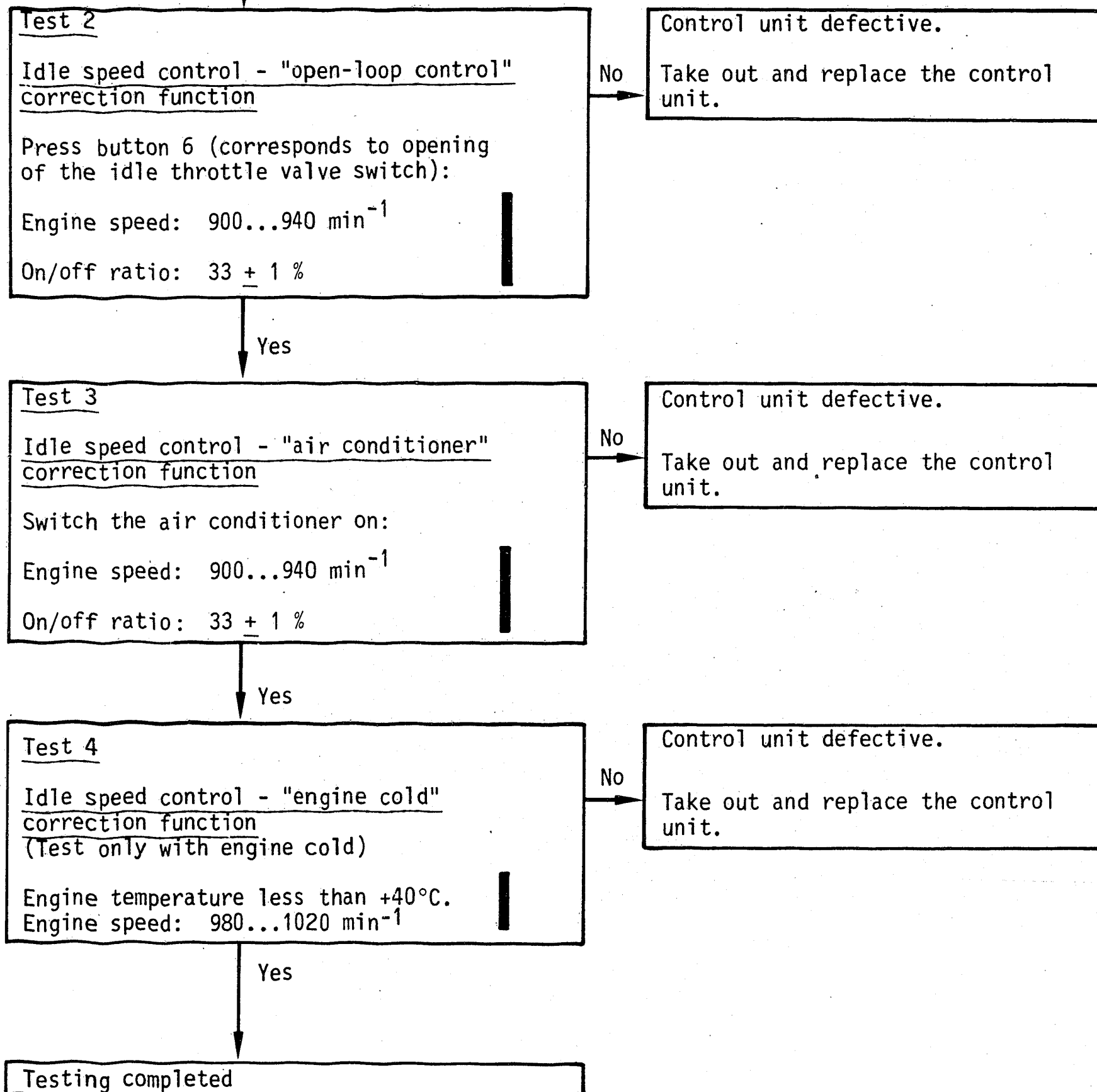


H12

Idle adjustment

Audi 4000 four-wheel drive (USA)



**H13**Idle adjustment
Audi 4000 four-wheel drive (USA)**H14**Idle adjustment
Audi 4000 four-wheel drive (USA)

After-sales Service

Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

43

Continuous Injection System mixture control-unit

VDT-I-438/100 B

Ed. 2 7.1975

Translation of German
edition of 1.7.1975

The mixture control unit is still being reported as one defective unit in warranty claims. We wish to point out expressly that the mixture control unit consists of two separate products, the air-flow sensor and the fuel distributor, and that there are separate defect numbers for them in the warranty manual. Please report only the defective product.

Accessory Sets

Various fuel distributors and warm-up regulators have been supplied up to now with pressed-in plug connectors. These will no longer be supplied in future.

	no longer available	Replacement + accessory set
Fuel distributor	0 438 100 002	0 438 100 017
	0 438 100 003	0 438 100 005 + 2 437 001 001
	0 438 100 004	0 438 100 017
Warm-up regulator	0 438 140 002	0 438 140 004 + 1 437 000 000

The accessory sets contain the required number of tailpieces and seal rings.

Please note: the accessory set 2 437 001 000 is delivered included with the fuel distributor 0 438 100 017, and does not therefore need to be ordered separately.

Electric Fuel Pump

In the Technische Mitteilung VDT-BMO 114/1 B and the Service Information sheet VDT-I-740/2-1 B 1st. supplement, we announced that the non-return valve can be replaced on the electric fuel pump 0 580 254 996. We have come to the conclusion from the warranty claims that not enough use is being made of this possibility. Please bear this fact in mind and repair leaky electric fuel pumps before deciding to replace the entire assembly.

In case of inquiry, please contact your authorized representative.

ROBERT BOSCH GMBH
Geschäftsbereich KH
Kundendienst - Technik

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N1

Technical Bulletin

Audi 4000 four-wheel drive (USA)



After-sales Service

Technical Bulletin

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Packaging of goods under warranty

K-Jetronic (CIS)

438

VDT-I-438/101 B

10. 1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

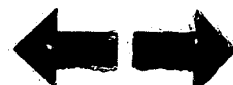
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Securing of idle-speed adjusting screws

K-Jetronic (CIS)

438

VDT-I-438/102 B
11.1976

According to a statutory regulation, changes have been made to § 47 of the German traffic licensing laws concerning exhaust gases and their outlets. This regulation was printed in full in traffic law sheet 13 of 15.7.75.

Consequently, all motor vehicles with external-ignition engines must have their idle-speed adjusting devices secured from the 1st October 1976, so that adjustment of the screw is impossible without destroying the securing device. This should stop unskilled people from adjusting the installation of the idle-speed system and thereby illegally influencing the emission values. As from now, securing caps can only be used in the workshop and cannot be sold to customers for their own use.

Securing caps are produced in various colors. For after-sales service the following caps and colors are used:

downdraft air-flow sensor

Blue

securing cap is not available from BOSCH.

Part number is DB 000.997.59 86 from the
Deutsche Vergaser Gesellschaft K 34 520

updraft air-flow sensor

Red

Part number 3 430 522 002

These stipulations are only valid in countries where ECE regulations (Economic Commission for Europe) apply. The air-flow sensors must however be converted for the use of these securing caps, as a matter of principle. The caps can also be used in countries not subject to ECE regulations, to prevent dirt penetrating through the pipe to the adjustment in the case of updraft air-flow sensors.

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438

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 580 254

VDT-I-438/104 En

3.1984

(Replaces Ed. 3.1983)

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal
0 580 254 001	1 587 010 500	---	---
003	502	---	---
005	502	---	---
007	500	---	---
008	508	---	---
010	508	---	---
011	002	---	---
941	002	---	---
942	002	---	---
945	006	---	---
947	002	---	---
948	005	---	---
949	002	---	---
950	006	---	---
952	002	---	---
953	501	---	---
954	002	---	---
956	002	---	---
957	002	---	---
959	002	---	---
960	002	---	---
961	002	---	---
963	005	---	---
964	002	---	---
965	002	---	---
967	002	---	---
968	002	---	---
970	002	---	---
972	002	---	---

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Technical Bulletin

Audi 4000 four-wheel drive (USA)



Electric fuel pump	Parts set (non-ret. valve and seal ring)	Non-return valve	Seal
0 580 254 973	1 587 010 002		
975	003 ⁴		
976	004 ³		
978	1 587 410 901		
979	010 004 ³		
980	002		
982 ¹	003 ⁴		
982 ²	1 587 410 901		
984	010 004 ³		
985	---	1 583 385 006	1 580 203 002
986	---	386 011	001
987	---	008	001
988	---	008	001
989	---	008	001
990	---	385 004	002
991	---	004	002
992	1 587 010 001	---	---
996		386 001	001
998		385 004	002
9 580 233 014	508	---	---
234 003	002	---	---
005	002	---	---

¹ = up to FD 822 ² = as from FD 823

³ = parts set ..003 can also be used (delivery-
line connection at 90°)

⁴ = parts set ..004 can also be used (delivery-
line connection axial)

Please direct questions and comments concerning the
contents to our authorized representative in your country.

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Technical Bulletin

Audi 4000 four-wheel drive (USA)^o



After-sales Service

Technical Bulletin

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KE-JETRONIC

After-sales service procedure

VDT-I-438/109 En

10.1982

Brief description of the system

The KE-Jetronic is a continuously operating gasoline injection system which is electronically controlled.

The difference from K-Jetronic: the warm-up control and additional control functions (e.g. voltage increase for starting and overrun fuel-cutoff) are taken over by an electrohydraulic pressure-correcting element which replaces the warm-up regulator. The pressure-correcting element is fitted directly onto the fuel distributor.

Users

Mercedes-Benz as the first vehicle manufacturer to offer KE-Jetronic, has fitted it to the 190 E (type W 201, starting 10.1982).

Components

Air-flow sensor	0 438 121 001	Fuel filter	0 450 905 406
Fuel distributor	0 438 101 001	Fuel accumulator	0 438 170 038
Pressure-correcting element	2 437 020 003	Start valves	0 280 170 412
Auxiliary-air device	0 280 140 161	Pressure regulator	0 438 161 001
Injection valves	0 437 502 010	Temperature sensor	0 280 130 034
Electric fuel pump	0 580 254 950	Control unit	0 280 800 100

The part numbers are also listed on the vehicle equipment microfiche AA ...

Service/exchange parts

The air-flow sensor can be partly repaired (for scope of replacement see microfiche EE .. under 0 438 121 ..).

The fuel distributor and the control unit are also available as exchange items (see exchange microfiche WB .. and exchange price list PD 02).

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Technical Bulletin

Audi 4000 four-wheel drive (USA)



Testing concept

The testing of the system in the vehicle is carried out not only with the test apparatus used for K-Jetronic, but also with the universal test adapter in conjunction with a special system adapter cable as well as a commercially available multimeter.

Universal test adapter ETT 018.01, part no. 0 684 101 801

System cable part no. 1 684 463 .. (in preparation)

Supplied by Division K7 (Test Equipment).

Technical documentation

Technical Bulletin "New Product" VDT-I-438/3.

Trouble-shooting instructions and test specifications: SIS microfiche MB .. (in preparation).

Training

Technical training for this system is integrated into the courses on K-Jetronic and Jetronic special.

Retrofitting

This system is not intended for retrofitting.

Guarantee procedure

a) Federal Republic of Germany

Components on which a claim is to be made should be sent for inspection during the guarantee period via the relevant Bosch wholesaler to:

K5/QSG
Wareneingang
Am Boschwerk
7000 Stuttgart 30

with guarantee claim form G 20 and delivery slip KH/VKD3 - 15333

b) Other countries

Components on which a claim is to be made should be sent for inspection during the guarantee period to the appropriate representative in your country.

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Technical Bulletin

Audi 4000 four-wheel drive (USA)



After-sales Service

Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

LIQUID PETROLEUM GAS (AUTOGAS) SYSTEMS AND
VEHICLES WITH K-JETRONIC

VDT-I-Gen. 052 En
10.1982

Fitting at a later stage

Vehicles with K or L-Jetronic are not suitable for fitting at a later stage with liquid petroleum gas (LPG) systems.

Numerous problems can occur, such as:

- Reduction of fuel flow through the injection valves due to deposits
- Stiffness or blocking of the K-Jetronic fuel distributor plunger (due to gumming or similar) in the course of time with "gas only operation."
- Increased danger of backfiring in the intake manifold (burbling) and thereby damage to the air-flow sensor.

Guarantee

Guarantee claims for failed Jetronic components from vehicles thus converted will not be accepted.

Conversion to liquid gas operation is made at the risk of the vehicle owner.

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Motor Vehicle Service Information
Audi 4000 four-wheel drive (USA)



After-sales Service

Motor Vehicle Service Information

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UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En

1.1982

1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

2. Delivery dates and Part Numbers

Available as from 2.1982.

2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 l engines as from 9.1981, and for Opel 2.0 l engines (Manta/Rekord) as from 9.1981.

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Motor Vehicle Service Information

Audi 4000 four-wheel drive (USA)



2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124

First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

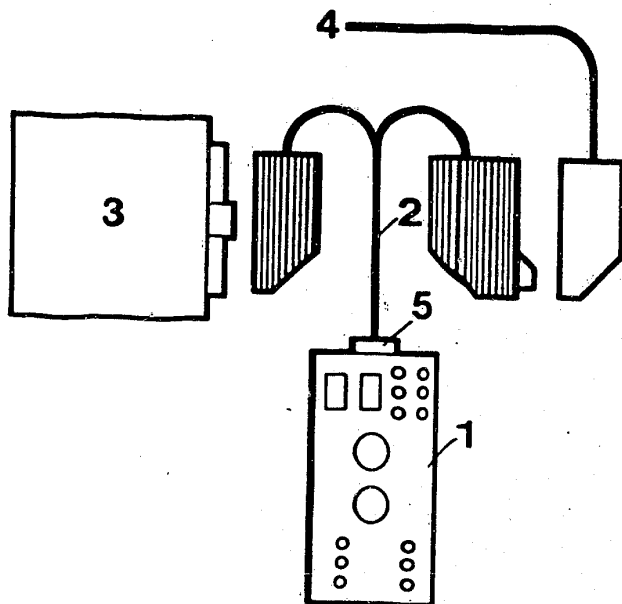
3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

3.1 Adapter lead for peripheral and function testing (Model 1)

The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).
To be tested: Wiring harness with components and control unit.



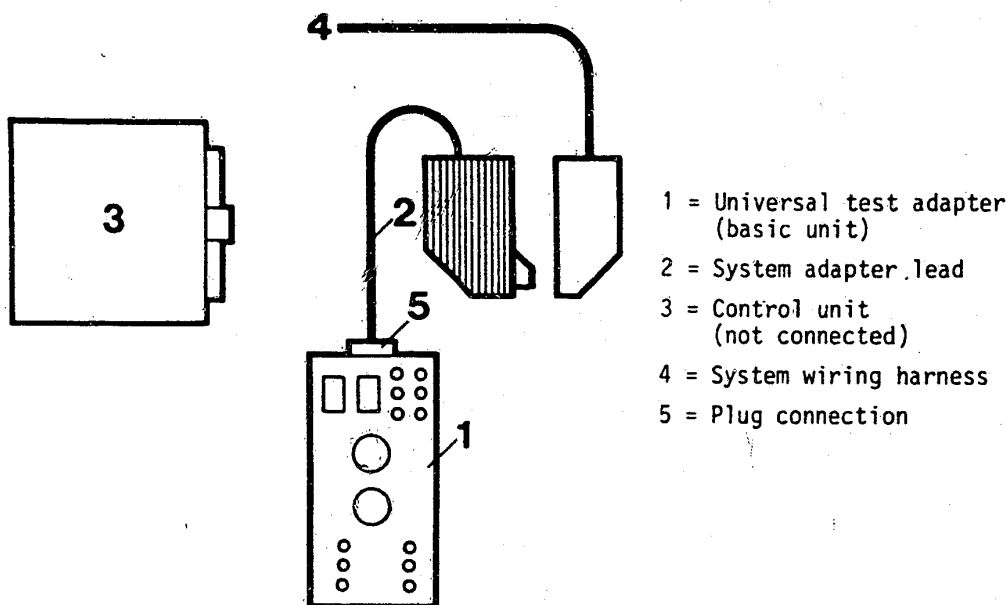
- 1 = Universal test adapter (basic unit)
- 2 = System adapter lead (Y-version)
- 3 = Control unit
- 4 = System wiring harness
- 5 = Plug connection



3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

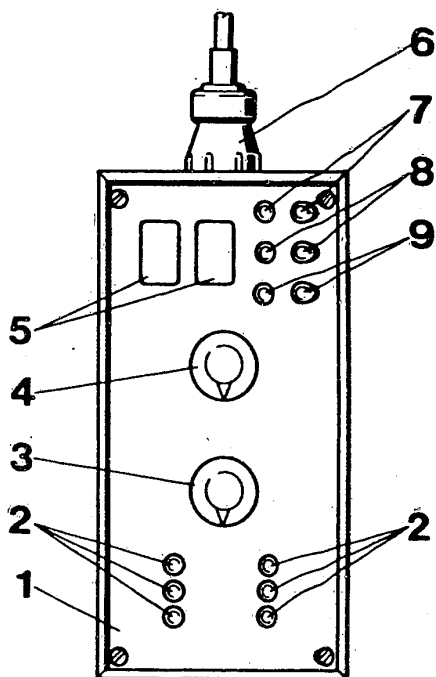


4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches footage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.





- 1 = Universal test adapter (basic unit)
- 2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.
- 3 = Program switch "Ohm" for resistance measurement
- 4 = Program switch "Volt" for voltage measurement
- 5 = Measurement "cavities" (for the special input from the Motortester)
- 6 = 63-pole plug-in connection for connecting the system adapter lead
- 7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)
- 8 = Measurement sockets (resistance measurement with the multimeter)
- 9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).
2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/J22 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123



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